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February, 1952 No. 2

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

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***EDITORIAL OFFICE:** Washington, D. C. **P.O. ADDRESS:** Box 1736, Washington 13, D. C. Telephone: REpublic 6278.

ADMINISTRATIVE OFFICE: American Meteorological Society, Office of Executive Secretary, 3 Joy Street, Boston 8, Mass.

* Address all business communications, orders and inquiries to the Executive Secretary, Mr. Kenneth C. Spengler, 3 Joy Street, Boston 8, Mass. Exchanges and reprints may be sent direct to P. O. Box 1736, Washington 13, D. C.

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METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

Vol. 3 FEBRUARY 1952 No. 2

SPECIAL FEATURE IN THIS ISSUE

A Selective Annotated Bibliography on Carbon Dioxide in the Atmosphere

(For complete table of contents see back cover)

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FOREWORD

Meteorological Abstracts and Bibliography is a monthly publication whose purpose is to ring to the attention of meteorologists current literature in their field and in related fields and o provide bibliographic information on various subjects, as interest demands.

Part I contains from 175 to 300 abstracts of current periodical literature and monographs in ie fields of meteorology, hydrology, oceanography, etc. These abstracts are arranged cording to the Universal Decimal Classification.

Part II of each issue comprises a special annotated bibliography of from 50 to 250 im- ortant references on a special subject without respect to recency of material. No attempt made to prepare exhaustive bibliographies; instead, the aim is to include a representative oss section of the various aspects of a subject. Preference is given to recent material, mprehensive works, material from obscure sources, and items with good bibliographies.

Bibliographies previously published were:

o. Mo.	Vol. I, 1950	Vol. II, 1951
1. Jan.	**Atmospheric Pollution**	**Extended Forecasting**
2. Feb.	**Aerobiology**	**Long Range Forecasting**
3. March	**Cloud Physics and "Rain Making"**	**Soil Temperature**
4. April	**Hail**	**Constants, Units, Tables and Diagrams**
5. May	**Tornadoes**	**Climate of the Near East**
6. June	**Volcanic Dust**	**Climate of the Middle East**
7. July	**Climatic Changes**	**Special Winds**
8. Aug.	**Thunderstorms**	**Radar Storm Detection**
9. Sept.	**Icing**	**Condensation Trails**
0. Oct.	**Acoustical Propagation**	**Climate of Northeast Africa**
1. Nov.	**Evaporation**	**Mountain Meteorology**

Bibliographies published this year were:

1. **Climatology of Northwest Africa,** Vol. III, No. 1, Jan. 1952
2. **Carbon Dioxide,** Vol. III, No. 2, Feb. 1952

Forthcoming bibliographies will be:

3. **Climates of Argentina, Paraguay and Uruguay,** Vol. III, No. 3, March 1952
4. **Dew,** Vol. III, No. 4, April 1952
5. **Objective Forecasting,** Vol. III, No. 5, May 1952

Other bibliographies in preparation are:

Actinometers
Climate and Cancer
Climate of Central Africa
Climate of Southeast Asia
Climate of the East Indies
Frost and Frost Forecasting
Glazed Ice
Machine Methods in Meteorology
Microwave Transmission
Oceanographic Meteorology
Ozone
Stratus Forecasting
Tropopause Variations
Turbulence
Urban Climatology
Visibility

Part III contains a listing of the contents of those journals which are primarily meteoro- gical. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes. In the June and Decem- er issues cumulative indexes are published.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where the material may be found. The Union List of Serials (Gregory) is the source of most of the symbols used. In some cases, where no symbol has been assigned to a library, one will be devised according to the principles of the Union List.

Library symbols used frequently may be found in the following list:

DA:	U. S. Dept. of Agriculture Library, Washington, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DSI:	Smithsonian Institution Library, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.
GB-MO:	Great Britain, Meteorological Office Library, Harrow, England.
MH-BH:	Harvard University, Blue Hill Observatory (and American Meteorological Society) Library, Milton, Mass.
NN:	New York Public Library, New York, N. Y.
NNA:	American Geographical Society Library, New York, N. Y.

Other symbols:

*	before an entry indicates a good data source.
†	before an entry indicates a good bibliography.
§	before an entry indicates a synoptic case history study accompanied by charts.

Geographic locations are in the English form rather than the form used locally, for example, Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless otherwise stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet according to the Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months are abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Number (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus an entry will read as follows:

Meteorologische Rundschau, 2(5–6):146–151, May–June 1950.

This indicates that the article appeared in *Meteorologische Rundschau*, *Jahrgang* 2 (Vol. 2), *Heft* 5–6 (No. 5 and 6), *pages* 146–151, May–June 1950.

PART I. ABSTRACTS OF CURRENT MATERIAL

GENERAL METEOROLOGY

3.2–1 551.5(02) 551.58(02)

Hoffmeister, Johannes, **Kleine Wetterkunde; eine Einführung in die Meteorologie.** [Short course in weather science; an introduction to meteorology.] Braunschweig, Georg Westermann, **1950.** 119 p. 58 figs., 8 photos, biblio. p. 118–119. **DLC**—A short, but well illustrated and scientific text on meteorology and climatology with due attention to the synoptic and dynamic aspects of both subjects. Microclimatology, bioclimatology, singularities in the annual course of weather elements and long range weather forecasting are given special attention. *Subject Headings:* **1. Meteorology 2. Climatology 3. Textbooks.**—*M.R.*

3.2–2 551.5(06)

Germany. Meteorologisches Amt für Nordwestdeutschland, **Wetterlotse.** First number received: No. 1, Jan. **1949.** Latest received: No. 20/21, April **1951. DWB**—*Wetterlotse* is a periodical issued by the meteorological service of Northwestern Germany for the benefit of the meteorological observers engaged in marine meteorological work. It contains articles on weather and weather service in waters traversed by German vessels, simple articles on dynamic and synoptic meteorology and general meteorological information of interest to observers and articles of interest to "fishery workers." It resembles the *Forecaster's Forum* in a general way. *Subject Headings:* **1. Meteorology 2. Periodicals 3. Germany.**—*I.L.D.*

3.2–3 551.5:06(52)

Arakawa, H., **Present position of the Meteorological Service in Japan.** *Meteorological Magazine*, London, 80(949):204–205, July **1951. DWB**—Gives list of directors since 1875, periodicals and data publications and brief setup. Total staff is 5,400. *Subject Headings:* **1. Japan. Central Meteorological Observatory 2. Meteorological services 3. Japan.**—*C.E.P.B.*

3.2–4 551.5:06

Bilham, E. G., **First Congress of the World Meteorological Organization.** *Meteorological Magazine*, London, 80(948):153–155, June **1951.** photo. **DWB**—Account of the Congress at Paris March 19–April 28, 1951, and transfer of I.M.O. to W.M.O. April 4, with lists of Regional and Technical Commissions and their Presidents. *Subject Headings:* **1. World Meteorological Organization 2. Conferences.**—*C.E.P.B.*

3.2–5 551.5:06

Great Britain. Central Office of Information, **Your weather service.** London, H. M. Stationery Office, **1950.** 45 p. figs., 8 plates. **DWB**—A popular well-illustrated account of the work of the British Meteorological Office. The chapters are: "How a modern weather forecasting service works;" "Public and personal services" (different types of general and special forecasts); "How to interpret weather forecasts;" "The treasury of weather records" (climatic records and their use in town planning, agriculture, etc., marine meteorology and the library). Appendices include supply of information and a climate table for London. *Subject Headings:* **1. Meteorological services 2. Great Britain. Meteorological Office 3. Weather forecasting.**—*C.E.P.B.*

3.2–6 551.5:06(09)

Frankcom, C. E. N., **Editorial.** *Marine Observer*, 21(153):139–142, July **1951.** 2 photos. **DWB**—A brief history of international meteorology and of the World Meteorological Organization. Photos of Congresses, Rome 1879 and Paris 1951. *Subject Headings:* **1. World Meteorological Organization 2. History of meteorology.**—*C.E.P.B.*

3.2–7 551.5:06

McTaggart-Cowan, P. D., **Post-war meteorology in Canada.** *Royal Meteorological Society, Canadian Branch [Publications]*, 2(3), Jan. **1951.** 14 p. 8 figs. Mimeographed. **MH-BH**—Review of five years' progress of the Canadian Weather Service. After noting some of the problems resulting in the change from wartime to peacetime activities, the author describes the present organization of the Meteorological Division which is made up of the following services: Forecast, Administrative, Research and Training, Basic Weather and Climatology. Improvements and problems yet to be solved are outlined for each service. As evidence of progress is the expansion of the teletype system, wider use of facsimile map transmission, establishment of a Verification Centre and decentralization of the Public Weather Service. The Ocean Weather Ship program and Joint Arctic Weather Stations were considered especially noteworthy achievements. *Subject Headings:* **1. Progress in meteorology 2. Meteorological services 3. Canada. Meteorological Division.**—*M.L.R.*

3.2–8 551.5:06:629.13

U. S. Dept. of Defense, Panama Area Joint Committee, **Report on consolidation of Armed Forces meteorological facilities in the Panama Area.** Quarry Heights, Canal Zone, April 14, **1950.** 26 p. chart. **DWB**—Recommendations as to feasibility of consolidating Navy Weather Central at Coco Solo with Sixth Weather Squadron Detachment, Albrook Air Force Base. Duplication in collection, plotting and evaluating weather data can be avoided. Facts in support of recommendations are presented. *Subject Headings:* **1. Aeronautical meteorology 2. Meteorological services 3. Panama Canal Zone.**—*M.R.*

3.2–9 551.5:06

van Eimern, J., **Gemeinsame Tagung der Deutschen Geophysikalischen Gesellschaft und der Meteorologischen Gesellschaft in Hamburg am 23.–28. Oktober 1950.** [Joint meeting of the German Geophysical Society and the Meteorological Society in Hamburg, Oct. 23–28, 1950.] *Erdkunde*, 5(1):87–88, **1951. DLC**—A meeting in honor of 70th birthday of A. WEGENER, October 25. Papers, briefly summarized here, deal with geophysics, terrestrial magnetism, oceanography and all branches of meteorology. *Subject Headings:* **1. Conferences 2. Geophysics 3. Meteorological societies.**—*C.E.P.B.*

3.2–10 551.5:629.13(02)

*Montalto, Martino, **Meteorologia aeronautica.** [Aeronautical meteorology.] [Rome], Ministero dell'Aeronautica, **1941.** 266 p. photos, diagrs., graphs, equations. **DLC**—A standard textbook on aeronautical meteorology beginning with the basic principles of physics of the atmosphere; definitions of the common terms and zones of the atmosphere; factors affecting aviation; general circulation, gradient winds, orographic effects, clouds, fog, icing, storms, visibility, air masses, fronts, *stau*, föhns and cloud types; aerial navigation; synoptic charts and reports and, finally, meteorological instruments. Codes and forecasts are discussed in the appendix. *Subject Headings:* **1. Aeronautical meteorology 2. Textbooks.**—*M.R.*

3.2–11 551.5:63:06

Schmithüsen, I., **Agrarmeteorologische Tagung in Stuttgart-Hohenheim am 14. und 15. April 1951.** [Agricultural meteorological congress in Hohenheim (Stuttgart) April 14–15, 1951.] *Erdkunde*, 5(3):264–266, **1951. DLC**—Summarizes briefly 31 papers on soil moisture, improvement of soil climate, protection from wind and frost, comparison of yields with weather conditions and local climate, etc. *Subject Headings:* **1. Agricultural meteorology 2. Conferences.**—*C.E.P.B.*

3.2–12 551.5:92

Godske, C. L., **Vilhelm Bjerknes†.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 3(5):470–471. **1951. MH-BH**—An account of his work on physical hydrodynamics and dynamic-synoptic meteorology. Born March 14, 1862, died April 9, 1951. *Subject Headings:* **1. Biography 2. Bjerknes, Vilhelm F. K.**—*C.E.P.B.*

3.2–13 551.5:92

Great Britain. Meteorological Office, **Vilhelm F. K. Bjerknes, For. Mem. R. S.** *Meteorological Magazine*, London, 80(949):181–184, July **1951.** photo, 19 refs. **DWB**—Account of his life and associations with Britain. Bibliography of his principal works. *Subject Headings:* **1. Bjerknes, Vilhelm F. K. 2. Biography.**—*C.E.P.B.*

METHODS OF OBSERVATION AND INSTRUMENTS

METHODS OF OBSERVATION

(*See also item:* 3.2–164)

3.2–14 551.501.1:551.521.63:551.586

Bleibaum, Irma, **Messungen des Ultravioletts der Sonnenstrahlung mit dem U.V.-Dosimeter der I. G. Farbwerke-Ludwigshafen in verschiedenen Höhenlagen Thüringens ohne Benutzung der dem Instrument beigegebenen Intensitätstabellen.** [Measurements of UV solar radiation with the UV dosimeter of the I. G. Farbwerke, Ludwigshafen, at different heights in Thuringia without using the intensity tables accompanying the instrument.] *Meteorologische Rundschau*, 4(7–8):144–146, July–Aug. **1951.** 2 figs., table. **MH-BH**—The tables to go with the instrument are not always applicable because standard conditions may not be reproduced. For medical purposes the required exposure is more important than the intensity. Simultaneous comparative timings for a given discoloration were made on clear days at heights of 100–720 m. and showed that comparable results could be obtained in this way. *Subject Headings:* **1. Ultraviolet radiation measurement 2. Medical meteorology 3. Thuringia, Germany.**—*C.E.P.B.*

3.2–15 551.501.1:629.13(02)

Spain. Servicio Meteorológico Nacional, **Reglamento general para la protección meteorológica de la aeronáutica internacional.** [General regulation for the meteorological protection of international aeronautics.] *Spain, Servicio Meteorológico Nacional, Publicación, Ser. C. Instrucciones*, No. 24, **1949.** 78 p. **DWB**—A Spanish edition of the I.M.O. Publication No. 72, which provides the general rules, procedures and instructions for International Aviation Meteorological Service, including codes, observations, forecasts, transmissions, climatic tabulations, flight plans, publications, etc. *Subject Headings:* **1. Instruction for observers 2. Aeronautical meteorology 3. Manuals.**—*M.R.*

3.2–16 551.501.1

U. S. Weather Bureau, **The autobiography of a climatological form.** Washington, D. C., May 1, **1951.** 4 p. **DWB**—A facetious account of the steps which are used in the modern processing by punched card methods of cooperative observers' records. Methods of checking, tabulating, summarizing and publishing are outlined. *Subject Headings:* **1. Data processing 2. Punched card methods.**—*M.R.*

3.2–17 551.501.3:551.513

Forsdyke, A. G., **Zonal and other indices.** *Meteorological Magazine*, London, 80(948):156–161, June **1951.** fig., 11 refs. **DWB**—After describing various circulation indexes, H. C. WILLETT's correlations between them are summarized, including one of 0.52 between pressure deficit N. of 45°N. and heat transfer across 45°. Indexes are of no direct use in forecasting but have an indirect use in discussing movements of long atmospheric waves. *Subject Headings:* **1. General circulation 2. Zonal index.**—*C.E.P.B.*

3.2–18 551.501.4(02)

U. S. Air Weather Service, **Dew point charts.** *U. S. Air Weather Service, Manual* 105–68, Jan. **1951.** 5 p. 2 charts. **DWB**—Two nomograms are included for use by U. S. Air Weather Service observers on reconnaissance flights for computing dew point temperatures from readings of wet bulb temperature and depression of wet bulb at various altitudes from sea level to 20,000 ft. Formula used in construction of diagrams is given and method of constructing and

using chart explained. Chart I is used for temperature (wet bulb) above 0°C; chart II for subfreezing wet bulb temperatures. *Subject Headings:* **1. Nomograms 2. Dew point temperatures.**—*M.R.*

3.2–19 551.501.45:681.177

Gordon, A. H., **Adaptation of mechanical sorting and tabulating machines to research in marine climatology.** *Meteorological Magazine*, London, 80(951):269–270, Sept. **1951.** 2 photos, table, 2 refs. **MH-BH**—A description of the Hollerith setup in the British Meteorological Office and some examples of problems suitable for investigation (e.g., influence of strength of wind on sea and air temperatures). *Subject Headings:* **1. Punched card methods 2. Marine meteorological data 3. Hollerith machines.**—*C.E.P.B.*

3.2–20 551.501.45:681.177

Pollak, Leo Wenzel, **Conversion of Hollerith punched card machines for use of un-punched cards.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 2(5):462–467, **1951.** 4 figs., 7 refs. English, German and French summaries p. 462–463. **MH-BH**—Describes a method in which punched cards of meteorological data are replaced by cards with inscribed spots. These are scanned photoelectrically by an adapted Hollerith sorter. Advantages—errors can be erased and cards can be used repeatedly. *Subject Headings:* **1. Punched card methods. 2. Mark-sensed cards 3. Hollerith machines.**—*C.E.P.B.*

3.2–21 551.501.45(02)

U. S. Air Weather Service, **Theory and design of a gradient wind scale.** *U. S. Air Weather Service, Technical Report* 105–69, Nov. **1950.** 15 p. 3 figs., 2 tables, 3 refs. **DWB**—After checking various gradient wind scales for efficiency and accuracy, the U. S. Air Weather Service adopted one prepared by Major ARTHUR F. GUSTAFSON for use throughout their service. The theory and actual data entering into this scale are given, as well as instructions for use. *Subject Headings:* **1. Gradient wind scales 2. Nomograms 3. Service manuals.** —*M.R.*

3.2–22 551.501.7:551.511

†Morán Samaniego, Francisco, **Aplicaciones teóricas y aerológicas de los diagramas termodinâmicos. El diagrama politrópico.** [Theoretical and aerological applications of thermodynamic diagrams. Polytropic diagram.] *Spain, Servicio Meteorológico Nacional, Publicación, Ser. A*, No. 16, **1943.** 43 p. 26 figs., 35 refs., 57 equations. **DWB**—A manual explaining in detail the theory, construction and uses of the emagram and the polytropic diagram in meteorology, hydrodynamics and thermodynamics. The tephigram, Rossby diagram, and other variations used in aerological work also explained. *Subject Headings:* **1. Emagrams 2. Aerological diagrams 3. Tephigrams 4. Rossby diagram 5. Manuals. I. Spain. Servicio Meteorológico Nacional.**—*M.R.*

3.2–23 551.501.7(02)

U. S. Air Weather Service, **Upper wind code.** *U. S. Air Weather Service Manual* 105–21, Feb. **1950.** 23 p. **DWB**—A reference manual for coding and decoding upper wind observations for flight and analysis purposes by U. S. Air Weather Service personnel. The manual gives details of FM32-Pilot code adapted by the I.M.O. Symbols are defined, and examples of coding and an appendix giving regional interpretations and variations in coding upper wind reports in several countries, especially the U.S.S.R. code which varies considerably from the I.M.O. code are included. *Subject Headings:* **1. Upper air wind codes 2. Observers manuals 3. Synoptic codes.**—*M.R.*

OBSERVATIONAL DATA

(*See also item:* 3.2–145)

3.2–24 551.506.1(728.6)

*Costa Rica. Servicio Meteorológico Nacional, **Boletín Meteorológico.** [Meteorological Bulletin.] First issue received: No. 1, Jan.–March **1951.** 19 p. all tables. **DWB**—Gives

onthly data on precipitation and temperature. Also includes rainfall intensity, atmospheric ressure and relative humidity for San José. *Subject Headings:* **1. Climatic data 2. Monthly ulletins 3. Costa Rica.**—*W.S.*

3.2–25 551.506.1(728.1)

*Guatemala. Observatorio Nacional, **Boletín Meteorológico.** [Meteorological Bulletin.] irst issue received: Vol. 1, No. 1, July–Aug. **1949**; latest issue received: [Vol. 2] No. 4, Oct.–ec. **1950.** Bimonthly in 1949, quarterly in 1950. graphs, tables. format varies, c.t. and p. vary as to vol. for some nos. **DWB**—Vol. 2, No. 4 gives a monthly summary and data for ach month in the quarter and comparison with the same month in the previous year. Tables clude thrice-daily observations of temperature, pressure and humidity; dew point; duration, tensity and quantity of precipitation; wind; cloudiness, etc. Part of this data is also esented graphically. One hundred and forty-eight rainfall stations are listed with total nnual rainfall. Included are graphs of mean and extreme temperature, pressure, humidity nd precipitation for 10-day periods throughout the year. *Subject Headings:* **1. Observational ata 2. Monthly bulletins 3. Guatemala.**—*M.L.R.*

3.2–26 551.506.1:551.577(492)

Netherlands. (K.) Meteorologish Instituut, **Regen waarnemingen, 1948, 1949.** [Rain-ll observations, 1948, 1949.] *Netherlands, (K.) Meteorologish Instituut,* No. 117, **1950.** 1 p. all tables. **DWB**—A record of daily rainfall for the year at all stations recording recipitation data. *Subject Headings:* **1. Precipitation data 2. Netherlands.**

3.2–27 551.506.1(058)(899)

*Uruguay. Servicio Meteorológico, **Boletín Anual Meteorológico. Años 1942 y 1943.** Annual Meteorological Bulletin. Years 1942 and 1943.] Montevideo, **1947.** 118 p. gs., tables. **DWB**—Observations made at 11 stations are summarized by months and years nd daily values for some of the following elements given: sunshine, evaporation, vapor pressure, arth temperatures (at 0.3, 0.6, 0.9, 1.2, 1.5 and 3.0 m) and air temperature at various heights, uration of rainfall, etc. Mean isotherms and isohyets shown for each year. *Subject Headings:* **. Climatic data 2. Annual reports 3. Uruguay.**—*M.R.*

3.2–28 551.506.3:551.509.53

Baur, Franz, **Die Wiederholungsneigung von in der ersten Dezemberhälfte auftretenden üdwest- und Westlagen in Europa.** [The recurrence tendency of SW and W types occurring n Europe in the first half of December.] *Zeitschrift für Meteorologie,* 5(7–8):200–204, July–ug. **1951.** 2 tables, 7 refs. **MH-BH**—Continuation of controversy with M. Rodewald. Baur found a close connection between Berlin temperature Dec. 1–10, 1848–1950 and mean inter temperature. Rodewald (*see item* No. 2.4–36 April 1951 *Meteorological Abstracts*) ound no connection in 1766–1848. Here Baur recalculates the early Berlin temperatures and nds that of 26 winters with temperature excess 2.5°C. or more in both Dec. 1–10 and 1–15, 2 had excess in mean of Jan. and Feb. Warm winters are associated with low pressure at dinburgh and an excess of SW–W winds. *Subject Headings:* **1. Long period records 2. emperature trends 3. Severe winters 4. Berlin, Germany.**—*C.E.P.B.*

3.2–29 551.506.3(42):551.524.36:551.582.2

Great Britain. Meteorological Office, **Kew Observatory. [Long period averages of aximum, minimum and mid (½ max.+min.) temperatures for 1871–1950.]** London, 1951 3 p.] Duplicated. **[Long period averages of meteorological elements for periods ending 950.]** London, **1951.** [3 p.] Duplicated. **GB-MO**—These give 1) daily means of aximum, minimum and "mid" [½ (max.+min.)] temperature 1871–1950; 2) monthly means f these and of 24 hour mean, earth temperatures (1 ft. and 4 ft.), and grass minimum tem-erature, extremes of temperature and extreme dates of frost. *Subject Headings:* **1. Observa-ional data 2. Long period records 3. Temperature frequencies 4. England.**—*C.E.P.B.*

3.2–30 551.506.5(98/9)

Wegmann, E., **Entwicklungsstufen der Polarforschung.** [Stages of development of polar investigation.] *Polarforschung*, 3(1):30–32, **1951. DWB**—A brief account of 3 stages—1) topographical exploration; 2) movements of atmosphere and hydrosphere and land ice; 3) historical and geological investigations, past climates and deep-sea studies. *Subject Headings:* **1. Polar research 2. Arctic 3. Antarctic.**—*C.E.P.B.*

3.2–31 551.506.7(261)

*Dewar, D., **First year of upper air observations by ocean weather ships.** *Meteorological Magazine*, London, 80(951):245–253, Sept. **1951.** 2 figs., 5 tables. **MH-BH**—Summary of upper air temperatures and humidities at JIG (53°50′N., 18°40′W.) and ITEM (60°N., 20°W.) in Jan.–Dec. 1948. Tables give for heights 100–900 mb. mean and extreme temperatures with British stations for comparison, tephigrams for Jan. and July, mean and maximum humidity mixing ratios, and pressures and temperatures at tropopause. *Subject Headings:* **1. Upper air temperatures 2. Weather ships 3. Oceans.**—*C.E.P.B.*

3.2–32 551.506.9(98)

Macht, Hans G., **Meteorologische und fliegerische Erfahrungen von deutschen Wetter-erkundungsflügen in der Arktis, 1941–1944.** [Meteorological and flying experiences of German weather flights in the Arctic 1941–1944.] *Polarforschung*, 3(1):2–9, **1951. DWB**—Author carried out regular flights N. of 70°N. June 1941–Nov. 1944. Most of the material was lost but he describes meteorological and flying experiences. Accounts include summer sea fog, undisturbed southwesterly type, Arctic Front disturbance zone and warm fronts, shower weather in Arctic air and fine weather types with descending air in late spring—early summer and in autumn. Section on flying includes organization, navigation and special flying risks in the Arctic. *Subject Headings:* **1. Observational data 2. Aeronautical meteorology 3. Arctic.** —*C.E.P.B.*

3.2–33 551.507.2

Van der Tuuk Adriani, P., **The Netherlands weather ships.** *Marine Observer*, 21(154): 249–252, Oct. **1951.** fig. **MH-BH**—Includes a description and photograph of Ocean Weather Ship "Cumulus" and the meteorological work carried out. *Subject Heading:* **1. Weather ships.** —*C.E.P.B.*

INSTRUMENTS

3.2–34 551.508

Stucki, E. J., **Emploi des contacts électriques sur les manomètres, thermomètres, hygromètres.** [Use of electrical contacts on manometers, thermometers and hygrometers.] *Les Nouvelles de Haenni*, No. 34, June–Aug. **1951.** [7 p.] 5 figs. Trans. from: *The Engineers' Digest*, London, June **1951. DWB**—A brief description of the function of electrical contacts in meteorological instruments. Units used in recording equipment (pressure, temperature, humidity) and the incidental circuits and relays are illustrated. *Subject Headings:* **1. Meteorological instruments 2. Electric contacts.**—*M.R.*

3.2–35 551.508.25:551.521.61

Denver. University, Dept. of Physics, **Daylight luminescence and infrared absorption.** Denver, University, Dept. of Physics, Contract W19–122ac–16, Quarterly Reports, Nos. 5–12, July 1, **1949**–April 30, **1951.** 8 Vols. photos, diagrs., tables. **DWB**—Elaborate spectrometers and photographic equipment for recording infrared absorption from V-2 rockets have been developed and tested in the laboratory on Mount Evans, Col. (el. 14,150 ft.), by means of balloon ascents and spectrographs, to show absorption between 4.3 to 9.4μ. The details of the heliostate, the transmission grating spectrograph and concave mirror-prism spectrograph are described and illustrated, as well as the ground equipment, mountain installations, testing devices, calibration charts and actual records. Attempts were made at determining the amount of precipitable water vapor from infrared spectrometer data. *Subject Headings:* **1. Rocket instrumentation 2. Infrared spectroscopy 3. Absorption. I. Contract W19-122ac-16 II. Cohn, Byron E. III. Calfee, Robert IV. Gates, David V. Warren, Dana T.**—*M.R.*

3.2–36 551.508.26:551.508.71

Hesse, W., **Ein neues, stark empfindliches Temperatur-Feuchte-Messgerät.** [A new, very sensitive, temperature-humidity measuring apparatus.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B, 3:* 168–171, **1951.** 6 figs., ref. German, English and French summaries p. 168. **MH-BH**—Describes, with photos and wiring diagram, a new electric dry and wet instrument developed in Leipzig for exploration by auto. Accurate to 0.01°C. and 0.1% R.H., no lag. *Subject Headings:* **1. Thermometers 2. Hygrometers.**—*E.P.B.*

3.2–37 551.508.54 551.558.796

Grunow, Johannes, **Der Wetterdienst bei der internationalen Skiflugwoche vom 28.2.–6.3.1950 in Oberstdorf.** [The weather service in the international ski-jumping week from 28.2–6.3.1950 in Oberstdorf.] *Meteorologische Rundschau,* 4(3–4):62–64, March–April **1951.** 2 figs., ref. **MH-BH**—When a ski-jumper takes off he becomes a flier. To test whether up-currents help performance, currents were measured with a special hot-wire anemometer (working diagram shown). Length of jumps was governed by state of snow and personal factors but also increased with upward component of wind (by 10–20 meters when up-wind increased from 2–3 m/s). *Subject Headings:* **1. Anemometers 2. Vertical motion 3. Skiing.**—*E.P.B.*

3.2–38 551.508.71:551.571.31:551.571.4

Diem, Max, **Tagesgang der relativen Feuchtigkeit in der bodennahen Luftschicht im Gras und über nacktem Humus.** [Diurnal variation of relative humidity in the air layer near the ground over grass and bare soil.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B,* 2(5):441–447, **1951.** 7 figs., 9 refs. German, English and French summaries p. 441. **MH-BH**—Observations were taken at frequent intervals, day and night, with small hair hygrometers at heights of 2 to 38 cm. over soil grass-grown to 10 cm., and 1–39 cm. over bare soil, at Karlsruhe July 21–24, 1947. Isopleths and diagrams of diurnal variation are given. The local microclimate extends to ⅔ height of grass and to 2 cm. over bare soil. *Subject Headings:* **1. Diurnal humidity variations 2. Humidity distribution 3. Karlsruhe, Germany.** *C.E.P.B.*

3.2–39 551.508.765

Brun, Rinaldo; Levine, Joseph and Kleinknecht, Kenneth S., **An instrument employing a coronal discharge for the determination of droplet-size distribution in clouds.** *U. S. NACA, Technical Note* 2458, Sept. **1951.** 53 p. photos, diagrs., graphs, tables, refs., equations. **DWB**—A flight instrument that uses electric means for obtaining a measure of the droplet-size distribution in above-freezing clouds has been devised and given preliminary evaluation in flight. An electric charge is placed on the droplets and they are separated aerodynamically according to their mass. The desirable features of an instrument based on the method described are: 1) the instrument can be used in clouds with temperatures above freezing, 2) the size and the shape of the cylinders do not change during the exposure time, 3) the error caused by bounce-off is low, 4) the readings are instantaneous and continuous and 5) the fast instrument response permits the study of variations in cloud structure. *Subject Headings:* **1. Drop size distribution instruments 2. Cloud physics. I. U. S. NACA.**—*Author's abstract.*

3.2–40 551.508.77

Conover, John H. and Nastos, Thomas G., **Tests of Stewart and Victor precipitation gages.** Blue Hill Meteorological Observatory, July 26, **1951.** 6 p. 2 figs., 3 refs. **DWB**—One Victor Rain-Gage Company (Wichita, Kansas) gage and three M. C. Stewart (Ashburnham, Massachusetts) gages were compared at Blue Hill with a standard 8 inch gage, between Jan. 21 and June 16, 1951. Gages are described, locations shown on a chart and relation of catch to wind speed shown graphically. Errors are greater for snow than rain. The Victor gage is useless in snow, but the Stewart gage is not bad for snow and is satisfactory for rain. The Victor gage caught from 138 to 225% more drizzle than the standard gage when winds were 4 to 20 or more m.p.h. *Subject Headings:* **1. Rain-snow recorders 2. Rain gage comparisons.** *M.R.*

3.2–41 551.508.95

Rykhter, E. V., **Apparat ezhektsionnogo tipa dlia otbora gazovykh prob v atmosfernom vozdukhe.** [An ejection apparatus for sampling gases in the atmosphere.] *Gigiena i Sanitariia*, Moscow, No. 5:15–18, May 1951. 3 figs. **DLC**—The apparatus consists of an ejector, two high speed absorbers and of an air meter for measuring the amount of air absorbed. The device operates with the aid of a compressor of a truck that carries the sampling apparatus. A photograph and diagrams of the apparatus are given. *Subject Heading:* **1. Air sampling instruments.**—*I.L.D.*

SYNOPTIC ANALYSIS AND FORECASTING

(*See also items:* 3.2–28, 3.2–116)

3.2–42 551.509:551.576

Bull, G. A., **Stratus cloud near the east coast of Great Britain.** *Great Britain, Meteorological Office, Professional Notes*, No. 103, 1951. 16 p. 7 figs., 6 tables, 14 refs. M.O. 524c. **DWB**—Discusses physics and statistics of nonfrontal stratus cloud occurring with NE–E winds, produced by dynamical turbulence, on English and Dutch coasts. Except in winter, it generally clears during the day. A method of forecasting its occurrence or disappearance is illustrated by tephigrams. *Subject Headings:* **1. Stratus clouds 2. Cloud forecasting 3. Great Britain.**—*C.E.P.B.*

3.2–43 551.509.1(02)

U. S. Air Weather Service, **Weather analysis codes.** *U. S. Air Weather Service Manual 105–16*, March 1951. 63 p. **DWB**—Coding and decoding instructions for use by the U. S. Air Weather Service in preparing synoptic and upper air charts and in transmitting analyses, are given in this manual. Examples of synoptic charts and cross sections are given and prognostic charts included. *Subject Headings:* **1. Synoptic codes 2. Map analysis 3. Code manuals.**—*M.R.*

3.2–44 551.509.1(02)

U. S. Air Weather Service, **Russian weather codes.** *U. S. Air Weather Service Manual* 105–7, May 1951. 80 p. **DWB**—This manual contains detailed decoding instructions for Russian synoptic reports from land stations, ships, winds aloft and radiosonde. *Subject Headings:* **1. Code manuals 2. Russian weather codes 3. U.S.S.R.**

3.2–45 551.509.3:551.579

†Apollov, B. A., **Gidrologicheskie informatsii i prognosy.** [Hydrological reports and forecasts.] Moscow, Gidrometizdat., 1945. 49 p. diagrs., graphs, tables, numerous refs. **DLC**—A voluminous text for advanced students or workers in hydrometeorological forecasting or observing stations. The purpose of such work for the national economy, the history of such services in Russia and other countries, and problems for future development are outlined in the first chapter. The section on hydrological reports takes up the networks, types of observations, instruments, meteorological character of basins, types of river regimes and contemporary organization in the U.S.S.R. Pt. II is a very detailed exposition of methods of short range forecasts of river stage and runoff, of long range river forecasts and long range weather forecasts by various methods. The third part gives details of methods of forecasting ice formation, movement, thickness and breaking up of ice in rivers, lakes and seas. The work is full of the engineering type of graphs, correlation charts, references to native and foreign works and schematic diagrams, as well as examples of forecasts, calculation diagrams and tables. *Subject Headings:* **1. Hydrologic forecasting 2. Hydrologic networks 3. Ice forecasting 4. Long range forecasting 5. U.S.S.R.**—*M.R.*

3.2–46 551.509.3:551.579(02)

Belinskiĭ, N. A., **Morskie gidrometeorologicheskie informatsii i prognozy.** [Marine hydrometeorological reports and forecasts.] Leningrad, Gidrometizdat., 1950. 166 p. 58 figs., 12 tables, equations. **DLC**—A textbook designed for use by advanced students of

drologic forecasting based on empirical methods. The first few chapters take up in order e origin and development of the hydrometeorological forecast service in the U.S.S.R., the e hydrometeorology plays in the national economy, information on water, wave, ice and rrent conditions supplied to various interests by the hydrometeorological service, forecasts ued for sea, lake, river and ice conditions, methods of preparing and disseminating forecasts, ort range forecasts of swell, temperature and freezing of water bodies, long range forecasts ice movements in seas, lakes and rivers and, finally, the purpose of routine observations. *bject Headings:* **1. Marine forecasting 2. Hydrologic forecasting 3. Textbooks 4. U.S.S.R.** *M.R.*

3.2–47 551.509.3

Bushby, F. H., **Second report arising from Charney and Eliassen's method of computing recast 500 mb. contour charts.** *Great Britain, Meteorological Research Committee, M.R.P.* 2, S.C. II/73, March 13, **1951.** 5 p. 2 refs. Mimeographed. **DWB**—The Charney-iassen one-dimensional method of computing a forecast 500 mb. contour profile along a rallel of latitude is applied to latitudes 40°, 50° and 60°N. The statistical methods for sting the success of the Charney-Eliassen method are described. The Charney forecasting ethod has a standard of success that is somewhat less than that obtained by conventional recasting techniques. *Subject Headings:* **1. Weather forecasting 2. Statistical techniques.**—*L.D.*

3.2–48 551.509.3:629.12

Kraght, Peter E., **Problems in airline meteorology.** *New York Academy of Sciences, ransactions, 2nd Ser.*, 13(6):251–254, April **1951. DLC**—Under certain conditions, positive recasts can be made with confidence, but under other conditions, the critical limits are too gue or unpredictable and a positive forecast would be biased in respect to the actual confi-nce of the forecaster. The uncertainty factor in airline forecasting is usually resolved by a as in favor of the pessimistic, rather than optimistic, side. Thus, a ceiling forecast would be ade, not for the mean or median of possibilities, but for the value which would probably sult in a lower ceiling 5% of the time and an equal or higher ceiling 95% of the time. Other fety factors to balance the various uncertainty factors are mentioned. *Subject Headings:* **Airways forecasting 2. Forecast verification.**—*M.R.*

3.2–49 551.509.3:551.575:629.13

§Roche, R. D., **Yip Oxo weather. An investigation of below-minimum weather conditions the Willow Run Airport, Ypsilanti, Michigan.** Eastern Airlines, **1950.** 31 p. tables, charts, fs. **DWB**—Fog situations during 1947–50 are classified into pre-warm, frontal, air-mass and ixing radiation fog, and each of those classes broken down by types and months. Typical ses are discussed and sample synoptic charts presented. All cases of a type are analyzed raphically and boundary limits for forecasting fog or no fog drawn. Prediction of time of rrival or formation of fog and time of lifting, based on empirical rules supplementing standard les for movement of fronts or troughs, outlined in detail. A radiation fog graph is included by J. J. George). *Subject Headings:* **1. Fog forecasting 2. Objective forecasting 3. Airways recasting 4. Ypsilanti, Michigan.**—*M.R.*

3.2–50 551.509.33:517.512.2

Abbot, Charles Greeley, **Short periodic solar variations and the temperatures of Wash-gton and New York.** *Smithsonian Miscellaneous Collections*, 111(13), Oct. 4, **1949.** 8 p. figs., 3 tables, ref. **MH-BH**—Forecasts by periodicities of 6.6456 and 27.0074 days of dates minimum temperatures are stated to have been verified. *Subject Headings:* **1. Long range recasting 2. Temperature forecasting 3. Periodicities 4. Washington, D. C. 5. New ork. I. Smithsonian Miscellaneous Collections.**—*C.E.P.B.*

3.2–51 551.509.33

Pejml, Karel, **Dlouhodobé prognosy.** [Long range forecasts.] *Meteorologické Zprávy*, 3–4):87–89, **1950. DWB**—A short review of several methods of long range forecasting by eans of correlations, cycles, etc., especially the studies by Visser, Schmauss, Baur, Braak, c. *Subject Heading:* **1. Long range forecasting.**—*M.R.*

3.2–52 551.509.33

Takahashi, K. and coll., **Studies on the seasonal weather forecasting (1st report).** *Papers in Meteorology and Geophysics*, 2(1):6–29, March **1951.** 8 figs., 10 tables, refs., equations. In English. **MH-BH**—The contents of this study are as follows: 1) brief history of the studies on seasonal forecasting in Japan; 2) weather proverbs on seasonal weather forecasting; 3) seasonal forecasting by correlation coefficients; 4) seasonal correlation; 5) meaning of seasonal forecasting; 6) basic change and perturbation; 7) statistical nature of perturbation; 8) time interval of the average in seasonal weather changes; 9) secular changes of the normal values; 10) periodicity in seasonal weather changes; 11) periodogram analysis of 5-day mean values of temperature and pressure; 12) extrapolation by periodicity, and 13) 23.5 days and 34 days' periodicities. *Subject Headings:* **1. Seasonal forecasting 2. Weather lore 3. Japan.**—*From author's abstract.*

3.2–53 551.509.59:550.579.4

*Bernard, Merrill, **Data and sample computations related to flood forecasting.** Toronto, Meteorological Office, **1948.** 3 Vols. **DWB**—Elaborate computation sheets are presented in a systematic manner in these three volumes to show the various stages through which computations are carried in preparing seasonal flood forecasts for a sample area. The Grand River of Ontario and the precipitation stations in its catchment area are considered. Runoff in inches from Dec.–May, precipitation base, double mass plotting of individual stations against precipitation base, observed and adjusted precipitation, correlation for station weights; computation of effective seasonal precipitation and of monthly precipitation index; effect of previous years' index, forecast computation sheet and forecast opportunity curve, machine computation of cross products, computation of effective basin precipitation, etc. comprise steps in the process. *Subject Headings:* **1. Flood forecasting 2. Hydrometeorology 3. Punched card computation 4. Grand River, Ontario.**—*M.R.*

3.2–54 551.509.59:551.579.4

Bernard, Merrill, **Flood forecasts that reduce losses.** *Engineering News-Record*, 141(22): 64–66, Nov. 25, **1948.** 3 figs. Abstracted from reprint. **DLC**—Describes types of river flood forecasts, their bases and dissemination. Average annual flood loss could be greatly reduced by a more adequate forecasting service. *Subject Heading:* **1. Flood forecasting.**—*C.E.P.B.*

3.2–55 551.509.59:551.579.4

Linsley, Ray K., Jr., Foskett, L. W. and Kohler, Max A., **Electronic device speeds flood forecasting.** *Engineering News-Record*, 141(26):64–66, Dec. 23, **1948.** 5 figs., 19 equations. Reprint. **DLC**—Describes an "electronic flood routing machine" which automatically produces the hydrograph for a point lower down river from hydrograph of expected inflow at a higher point, based on records of past floods. *Subject Headings:* **1. Flood forecasting 2. Electronic computors.**—*C.E.P.B.*

3.2–56 551.509.59:551.579.4

Lundquist, Roy E. and Richards, Marshall M., **Flood forecast centers. What makes them.** *Engineering News-Record*, 140(24):98–100, Dec. 9, **1948,** 3 figs. Reprint. **DLC**—Description of River Forecast Center at Cincinnati in Ohio Basin—forecasting runoff, collecting rainfall and river-stage records and issue of forecasts in 2–3 hours. Results in 1948 set out. *Subject Heading:* **1. Flood forecasting.**—*C.E.P.B.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

STRUCTURE OF THE ATMOSPHERE—IONOSPHERE

(*See also items:* 3.2–78, 3.2–186, 3.2–200 and 3B–1 to 3B–229)

3.2–57 551.510.41

Caroli, V. G., **Ozonmessungen in Staufen.** [Ozone measurements at Staufen.] *Baden, Landeswetterdienst, Jahresbericht mit Abhandlungen*, **1950.** p. 14–15. 4 figs., 3 refs. **DWB**—

Describes ozone measurements in summer 1950, 7–22 h., showing variation in stable and labile situations (great decrease at night with valley wind). Author concludes that ozone-rich air descends in broad currents on steep slopes. *Subject Headings:* **1. Ozone measurement 2. Staufen, Germany.**—*C.E.P.B.*

3.2–58 551.510.41:551.521.61

Nielsen, H. H., **Infrared studies of atmospheric constituents.** Ohio State University, Contract AF 19(122)65, Progress Report No. 7–8, Feb. 15–May 15, 1951. 7 p. each. **DWB**—Investigations are in progress on mapping solar spectrum in 3μ to 5μ infrared region; $7–13\mu$; atmospheric nitrous oxide, ethylene, water vapor and CO_2 in lower atmosphere. *Subject Headings:* **1. Infrared radiation 2. Atmospheric composition. I. Contract AF-19(122)65.**—*M.R.*

3.2–59 551.510.42

Christie, A. G., **Air pollution.** *Mechanical Engineering*, 73(7):570–571, 575, July **1951. DWB**—A general article on all aspects of air pollution from industrial sources and its control by meteorological or chemical means. *Subject Heading:* **1. Atmospheric pollution control.**—*M.R.*

3.2–60 550.594.7 550.510.5:621.396.10:519.2

†Friedman, Bernard, **The dipole field in an inhomogeneous atmosphere.** *New York University, Mathematics Research Group, Research Report* No. EM-28, March **1951.** 56 p. 16 refs., 96 equations. Mimeographed. **DWB**—A theoretical study of microwave propagation around the earth in a stratified atmosphere. At first several approaches to a solution are reviewed. The method used by WATSON, RYDBECK, VAN DER POL and BREMMER has been extended to account for the general theory. The problem is that of finding the eigenvalues of an ordinary differential equation. The case of a uniform, a nonuniform atmosphere and the connection with the "Flat Earth" theory of FURRY, PEKERIS and others is developed. *Subject Headings:* **1. Dipole fields 2. Microwave propagation 3. Mathematical techniques. I. Contract AF-19(122)-42.**—*M.R.*

3.2–61 551.510.5:001

Chapman, Sydney, [**Some phenomena of the upper atmosphere.**] *Meteorological Magazine*, London, 80(949):194–195, July **1951. DWB**—Report of lecture at the Physical Society, May 2, 1951, on temperature distribution, composition, light of the night sky and ionosphere. New terms suggested: turbosphere, homosphere, electrojet (intense circulations in ionosphere). *Subject Headings:* **1. Upper atmosphere 2. Ionosphere 3. Definitions.**—*C.E.P.B.*

3.2–62 551.510.5:551.524.7:551.547:523.78

Kitaoka, T. and Yamasaki, M., **Preliminary reports on the upper air observations.** In: Report of solar eclipse observations May 9, 1948. *Geophysical Magazine*, Tokyo, 19(3–4):114–134, Dec. **1949.** 13 figs., tables, 5 refs. In English. **MH-BH**—Upper air observations of temperature and pressure were made with the radiosonde and double theodolite method throughout the day of the eclipse of May 9, 1948. In the lower atmosphere (below 2000 meters) the air temperature dropped by about 3°C. at the time of maximum obscuration and rose slightly ten minutes later at 700 meter level. The air pressure dropped at about time of maximum eclipse; this drop was more pronounced with height. Convergent flow at 700 m. level and divergent flow above 1000 m. were detected. In middle atmosphere (from 2000 m. to tropopause) no marked changes in temperature and pressure were observed. In the stratosphere, the drop in temperature exceeded 10°C. at the time of maximum obscuration; the change in temperature reached a maximum between 18 and 19 km. and then diminished; also the drop in air pressure is very pronounced. The shadow bands observed during the eclipse are described. *Subject Headings:* **1. Upper air temperature 2. Upper air pressure 3. Solar eclipses 4. Japan.**—*I.L.D.*

3.2–63 551.510.5:621.396.11

Slusser, E. A., **Predicting performance of UHF and SHF systems.** *Electronics*, 24(6):116–121, June **1951.** 14 figs., 2 tables, 18 equations. **DWB**—Topographic and atmospheric conditions affecting propagation of ultra high frequency waves are discussed and illustrated. Curves illustrate effect of rain and fog on SHF absorption. *Subject Heading:* **1. Microwave transmission.**—*M.R.*

3.2–64 551.510.53:06

Kaiser-Wilhelm-Gesellschaft zur Förderung der Wissenschaften and Max-Planck-Gesellschaft zur Förderung der Wissenschaften, **Tätigkeitsbericht für die Zeit vom 1.1.1946 bis 31.3.1951.** [Report of work for the period 1.1.1946 to 31.3.1951.] *Naturwissenschaften*, 38(16–18):361–380, 385–404, 409–431, Aug.–Sept. **1951. MH-BH**—This comprehensive report includes bibliography and summaries of work by reconstituted branches of the Max-Planck-Gesellschaft dealing with Physics of the Stratosphere (Prof. Regener) and Ionosphere Investigation (Dr. Dieminger). *Subject Headings:* **1. Stratospheric research 2. Ionospheric research 3. Max-Planck-Gesellschaft.**—*C.E.P.B.*

3.2–65 551.510.535:621.396.11

Stanley, J. P., **Ionospheric reflection of very long radio waves.** *Canadian Journal of Research, Section A, Physical Sciences*, 28(6):550–557, Nov. **1950.** 3 figs., 6 refs., equations. **DGS**—The "tarnished mirror" model of the long wave reflecting region of the ionosphere is used to calculate the variation of reflection and conversion coefficients with angle of incidence, assuming the earth's magnetic field to be vertical and the reflection and conversion coefficients at vertical incidence in an oblique magnetic field inclined 23° to the vertical. The solution of the equations of propagation under both conditions is presented. It was found that the assumption of a vertical magnetic field theory did not lead to errors in the calculated sky wave reflection and conversion coefficient that were greater than about 10 percent although the field was inclined as much as 23° to the vertical. *Subject Headings:* **1. Long wave propagation 2. Ionospheric reflection.**—*I.L.D.*

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

(*See also item:* 3.2–22)

3.2–66 551.511

Hinkelmann, Karl, **Horizontale Massendivergenz als Funktion des Luftdruckfeldes.** [Horizontal mass divergence as a function of the pressure field.] *Meteorologische Rundschau*, 4(3–4):53–55, March–April **1951.** 5 refs., 14 equations. **MH-BH**—After discussing difficulty of finding a satisfactory analytical expression for pressure tendency, author concludes that it is necessary to introduce a term for horizontal divergence of mass. He derives two possible approximations for this. The differential equations are too complicated to apply directly in forecasting but may possibly be replaced by difference equations soluble numerically. *Subject Headings:* **1. Dynamics of the atmosphere 2. Divergence 3. Pressure gradient.**—*C.E.P.B.*

3.2–67 551.511

Meteorological Office discussion: Vorticity in dynamical meteorology. *Meteorological Magazine*, London, 80(948):169–173, June **1951.** 3 figs. **DWB**—Discussion March 12, 1951. J. S. Sawyer described concepts of vorticity and circulation and applications of the vorticity equation especially to the calculation of divergence from isobaric charts (illustrated for March 16, 1949). A number of speakers discussed difficulties in application to forecasting. *Subject Headings:* **1. Dynamic meteorology 2. Vorticity.**—*C.E.P.B.*

3.2–68 551.511

†Miller, James E., **On energy equations for the atmosphere.** New York University, College of Engineering, Dept. of Meteorology, Jan. **1949.** 61 p. 15 refs., equations. **DWB**—A progress report on the development of complete energy equations for the atmosphere. The principles of conservation and transformations of energy and equations of mechanical energy are summarized and a general system is formulated by integrating for a large moving system.

The applications of the energy equations in theoretical meteorology are discussed. REYNOLDS' mathematical description of characteristics of atmospheric motion is examined and extended. It depends on time and space scales of the observations; limitations of these are considered and the equations adapted accordingly in terms of averaged velocities. Eddy transformation functions are set out. Finally, the various energy equations are summarized for unaveraged and averaged motion under various heads and the symbols used are defined. *Subject Headings:* **1. Energy equations 2. Dynamics of the atmosphere. I. New York University. College of Engineering, Dept. of Meteorology.**—*C.E.P.B.*

GENERAL CIRCULATION

(*See also item:* 3.2–17)

3.2–69 551.513:551.557

§Berson, F. A., **On the role of long-wave instability in the general circulation; a study of five-day means in November 1948.** *Sweden, Meteorologiska och Hydrologiska Institut, Meddelanden, Ser. A*, No. 3, **1950.** 13 p. 15 figs. (incl. synoptic charts), 16 refs., equations. **MH-BH**—Analyzing variations of zonal circulation at the surface and at 500 mb. as well as the large scale disturbances in the westerlies during November 1948 in the light of ROSSBY's theory on the formation of jet streams, the author examines the relationship between growth of planetary waves and the formation of jet stream segments to the south of the turbulent zone. Author has found a relation between the shift of successive west wind maxima and the growth of large scale turbulence in the circumpolar zonal current system. The relation between long wave growth and meridional mass exchange is discussed, with the aid of surface pressure data. Author concludes by stating that "distinct poleward and equatorward pressure 'surges,' found earlier by NAMIAS, are apparent." They are in the nature of circumpolar waves of about two weeks period. *Subject Headings:* **1. Zonal circulation 2. Waves in the westerlies 3. Instability 4. Turbulence.**—*W. N.*

3.2–70 551.513:551.555.1

Flohn, Hermann, **Passatzirkulation und äquatoriale Westwindzone.** [Trade wind circulation and equatorial west wind zone.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B, 3*:3–15, **1951.** 3 figs., 5 tables, 22 refs. German, English and French summaries p. 3–4. **MH-BH**—A study of the dynamics of the trade wind circulation from standpoint of upper air climatology. Within a few degrees of the equator over the Atlantic, surface and upper winds are unrelated. Outside this a meridional circulation is found, towards meteorological equator at surface, away from it at 2–3 km. height. Author then summarizes evidence for a west wind zone on both sides of the equator and plots its limits in winter and summer (about 25°W.–170°E.) and depth (up to 6½ km.). A revised scheme of the system: trade-countertrade-monsoon is formulated, with a meridional vertical section, to include this W. wind belt separating two inner tropical convergence zones. The Indian SW. monsoon is represented as a widening of this W. belt. *Subject Headings:* **1. Atmospheric circulation 2. Monsoon circulation 3. Equatorial meteorology.**—*C.E.P.B.*

3.2–71 551.513

Fultz, Dave and Long, Robert R., **Two-dimensional flow around a circular barrier in a rotating spherical shell.** *Tellus*, 3(2):61–68, May **1951.** 9 figs., 10 refs., 11 equations. **MH-BH**—Continuing the studies made at the hydrodynamics laboratory at the University of Chicago, using rotating spherical shells to simulate the motion of the earth (*see item* No. 26–61 in Feb. 1951 *Meteorological Abstracts*), the present experiment deals with the effect of a small cylindical obstacle, which interrupts the flow between the two shells in latitudes 30°–55°N. Tracers were used in the fluid and photographs made of the details of the flow, which are also brought out clearly by schematic diagrams. With a west wind the flow became strongly counter clockwise in the lee of the obstacle. When the flow was easterly at the same speed a disorganized pattern was observed in the lee. Effect of moving the barrier to the east was to produce a westerly jet. *Subject Headings:* **1. Orographic effects 2. General circulation 3. Rotating spherical shells.**—*M.R.*

3.2–72 551.513.1

Van Mieghem, Jacques, **Les bilans de la quantité de mouvement et de l'énergie mécanique dans l'atmosphère.** [The balance of the quantity of movement and mechanical energy in the atmosphere.] *Annales de Géophysique*, 6(4):227–237, Oct.–Dec. **1950.** 4 figs., 11 refs., numerous equations. French and English summaries p. 227. **DBS**—By means of the equation of continuity, the equations of dynamics and of energy in any coordinate system are transformed into the equations of balance, which contain expressions of the flux and the rate of production of momentum and of mechanical energy. Equations by means of which it is possible to calculate the balance of absolute kinetic momentum of the earth, the flux of absolute kinetic momentum across a parallel at a given level and across a given latitude and the balance of mechanical energy are developed. *Subject Headings:* **1. General circulation 2. Energy equations.**—*I.L.D.*

3.2–73 551.513.1

†Haurwitz, Bernhard, **Report on studies of atmospheric energy.** New York University, College of Engineering, Dept. of Meteorology, April **1949.** 38 p. 3 tables, 22 refs., equations. **DWB**—The paper opens with a brief statement of laws and equations. Estimates of internal and potential energy of atmospheric circulation and its seasonal variations were made from mean geostrophic winds up to 19 km. in 20°–70°N. and a model of the energy transformation formulated. The few determinations of energy changes from synoptic data are summarized and principles for further investigations set out with evaluations of the magnitude of the terms in the equations. The maintenance of a steady cyclonic circulation against friction is outlined and the mechanism described by Durst and Sutcliffe accepted. A new theory of the sea breeze as a simple small scale circulation maintained by a local temperature difference is described; it is confirmed by observations. *Subject Headings:* **1. Energy equations 2. General circulation 3. Dynamics of the atmosphere. I. New York University. College of Engineering, Dept. of Meteorology.**—*C.E.P.B.*

3.2–74 551.513.1:551.524.2

Hess, Seymour L., **The effect of the general circulation on the latitudinal and temporal distribution of temperature.** *Florida State University, Dept. of Meteorology, Technical Report*, May **1951.** 16 p. **MH-BH**—It has long been known that the equatorial regions are too cool and the polar regions too warm for a theoretical model of an earth without any large scale circulation. A quantitative estimate of this effect is worked out theoretically and compared with data for two latitude circles (50°N. and 67.5°N.) which comprise almost equal land and water areas. It appears that the temperature at 50°N. lags behind solar radiation 6.6 days and for a round earth 8.6 days. *Subject Headings:* **1. Eddy transport 2. Radiation balance 3, General circulation. I. Florida State University. Dept. of Meteorology. II. Contract NONR-158(00), Project NR 082071.**—*M.R.*

3.2–75 551.513.1:551.543.1

Labzovskiĭ, N. A., **K voprosu ob opredelenii ugla otkloneniia vetra v prizemnom sloe vozdukha ot napravleniia gradienta.** [Determination of the angle of deviation of the wind from the direction of the gradient in the atmospheric layer near the ground.] *Problemy Arktiki*, No. 2:108–114, **1944.** 4 figs., 3 tables, 4 equations. **DGS**—A study of data pertaining to the deviation of the wind from the direction of the baric gradient in the Kara Sea shows that the angle of deviation does not depend on the velocity of the wind, but rather on the density of the air; the value of the coefficient of friction between the air and the underlying surface of the Kara Sea does not vary from winter to summer. The author limits his findings to the investigated area. An application of the established relations to other regions requires additional survey. *Subject Headings:* **1. Gradient winds 2. Micrometeorology 3. Kara Sea, Soviet Arctic.**—*C.K.*

3.2–76 551.513.1

Nyberg, Alf and Schmacke, E., **Eddy flux of heat and momentum during two years at Stockholm-Bromma.** *Tellus*, 3(2):89–99, May **1951.** 7 figs., 4 tables, refs., equations. **MH-BH**—Aerological (radiosonde) data for Bromma has been used to calculate the eddy transport

of momentum, sensible heat and latent heat for the years 1946–48. The data for Bromma are compared with those for Larkhill for practically the same period as obtained by PRIESTLEY. Quantitative values for eddy flux per unit length of latitude, of latent and sensible heat, heat gain, westward drag due to surface friction, etc. for various seasons, are given. *Subject Headings:* **1. Eddy transport 2. Meridional heat flux 3. Stockholm, Sweden.**—*M.R.*

3.2–77 551.513.1

White, Robert M., **The meridional flux of sensible heat over the Northern Hemisphere.** *Tellus*, 3(2):82–88, May **1951.** 4 tables, 6 refs., 9 equations. **MH-BH**—The mean geostrophic eddy transport of sensible heat across various latitudes for the winter season 1945–46 for three layers (1013–700, 700–500 and 1013–500 mb.) was calculated and is presented in a table for lat. 75, 65, 55, 45 and 35°N. Approximately 70% of the eddy transport of sensible heat below 500 mb. occurs between 1013 and 700 mb. in contrast to the concentration of meridional eddy transport of angular momentum in the upper tropospheric layers. Validity of using geostrophic winds instead of actual winds checked against U. S. upper air data and it was found that eddy transport by actual winds was 20%. Results are compared with data of 1) ALBRECHT and 2) GABITES, and it is seen that eddy transport of sensible heat constitutes a large portion of that required to preserve temperature and radiation balance of earth between tropics and poles. *Subject Headings:* **1. Energy transport 2. Meridional heat flux 3. Geostrophic winds 4. Northern Hemisphere.**—*M.R.*

ATMOSPHERIC DISTURBANCES

(*See also items:* 3.2–138, 3.2–193, 3.2–200)

3.2–78 551.515.2:551.510.5

Arakawa, A., **Analysis of the tropopause and the stratospheric field of temperature of a mature typhoon.** *Papers in Meteorology and Geophysics*, Tokyo, 2(1):1–5, March **1951.** 2 figs., 2 tables, 5 refs., equations. In English. **MH-BH**—An analysis of swarm ascents during the passage of the typhoon "Kitty" indicates that in a typhoon circulation of mature stage of development there is downward displacement and warm air in the field of tropopause funnel in the cyclone core, and upward displacement and cold air in the field of the annular tropopause ridge in the storm area. *Subject Headings:* **1. Typhoon structure 2. Tropopause.**—*From author's abstract.*

3.2–79 551.515.2:551.589.1(02)

†*§U. S. Weather Bureau, **Hurricane notes.** *U. S. Weather Bureau, Training Paper* No. 1, July **1948.** 210 p. 80 figs., 217 refs. **DWB**—A thorough review of present knowledge of hurricanes, with emphasis on the air mass or synoptic aspects. Theories of origin, structure and forecasting are treated in detail. A good chronological bibliography of the best papers on tropical storms (1839–1947) is appended. Recent papers are abstracted in a second (5 page) appendix. *Subject Headings:* **1. Hurricanes 2. Training manuals.**—*M.R.*

3.2–80 551.515.2(04)

Radley, J. R., **Experiences of typhoons on the China coast.** *Marine Observer*, 21(154):237–241, Oct. **1951.** 2 figs. **MH-BH**—Popular account of experiences during several typhoons. *Subject Headings:* **1. Typhoons 2. China coast.**

3.2–81 551.515.2(262)

§Rodewald, Martin, **Schwerer Dezember-Sturm vor der algerischen Küste.** [Severe December storm near the Algerian coast.] *Wetterlotse*, Hamburg, No. 18:1–7, March **1951.** 2 figs. **DWB**—*Subject Headings:* **1. Tropical cyclones 2. Western Mediterranean.**

3.2–82 551.515.2(266,72)

Tropical storm. Gulf of Tehuantepec. *Marine Observer*, 21(154):208–209, Oct. **1951.** **MH-BH**—Oct. 3–4, 1950, near 14°N., 93–94°W., barometer fell to 999.8 mb., wind force 10 with central light winds. *Subject Headings:* **1. Tropical cyclones 2. Tehuantepec, Mexico.**—*C.E.P.B.*

3.2–83 551.515.2(265)

Typhoon, Pacific Ocean. *Marine Observer*, 21(154):209–210, Oct. **1951.** fig. **MH-BH**—Typhoon "Clara," Nov. 9, 1950, 25°N. 127°E. Barometer fell to 942 mb. in small center. Barograph trace shown. *Subject Headings:* **1. Typhoons 2. Pacific Ocean.**—*C.E.P.B.*

3.2–84 551.515.2(679)

Twin cyclone. Mozambique Channel. *Marine Observer*, 21(154):210–211, Oct. **1951. MH-BH**—Graphic description of weather between two centers of a cyclone on Dec. 25, 1950. *Subject Headings:* **1. Tropical cyclones 2. Mozambique Channel.**—*C.E.P.B.*

3.2–85 551.515.21(52)

Kanaya, Kozo, **On the effect of the dynamical pressure near the center of typhoon.** *Kobe, Marine Observatory, Memoirs*, 9:1–8, March **1951.** graphs, tables, equations, biblio. **DWB**—Pressure differences between Murota and Tsuro are tabulated for each hour from 11 p.m. on Sept. 2 to 4 p.m., Sept. 3, 1950, during the passage of the "Jane" typhoon over the Kansai District (near Kobe), Japan. It is assumed that the pressure difference before and after the typhoon was mainly the *static* pressure effect, whereas the anomalous or w-shaped curve of departures from this static pressure difference (reaching −8 mb. before passage of center, +2 mb. at center and −6 mb. after passage of center) would be due to dynamic effects of the hurricane structure near its center. Theoretical curves are shown to agree essentially with observed. *Subject Headings:* **1. Atmospheric pressure 2. Typhoon mechanics 3. Kobe, Japan.**—*M.R.*

3.2–86 551.515.21(52)

§Miyamoto, Masaaki, **On the typhoon Missatha; on the structure and movements of typhoons.** *Kobe, Marine Observatory, Memoirs*, 9:47–50, March **1951.** graphs, refs. **DWB**—Data on structure and movement of typhoon "Missatha" of Sept. 18, 1950 and other earlier typhoons indicate that erratic movements are often due to cellular structure within the general typhoon system. The cellular vortexes, which are of the order of 100–200 km. diameter (1/25 area of full typhoon) are accompanied by more severe wind systems than the main typhoon, but travel at about ¼ the speed of the main system and in a direction which is not consistent with the general movement. Tracks of several of these vortexes are shown and synoptic charts illustrative of conditions give an idea of the relative position of formation and movement of these cells. *Subject Headings:* **1. Typhoon structure 2. Cellular vortexes.**—*M.R.*

3.2–87 551.515.22

Burgner, Newton M., **The origin and detection of hurricanes.** *Weatherwise*, 4(4):75–78, 87, Aug. **1951.** 3 figs. **MH-BH**—A nontechnical discussion of the formation and detection of hurricanes. Hurricanes are formed as a result of the intensification of tropical storms by the interaction of two or more cyclonic disturbances either by relative motion between high and middle latitudes (easterly wave in the tropical trades and an upper level trough in the middle latitudes) or by relative motion between concurrent disturbances at high and low levels in the tropics. The principles of hurricane formation are illustrated by the hurricane of Sept. 6–8, 1947. The surface criteria of meteorological factors useful for hurricane detection are listed. *Subject Headings:* **1. Cyclonic storms 2. Cyclone structure 3. Hurricane detection.**—*I.L.D.*

3.2–88 551.515.3(262,267)

Waterspouts. Mediterranean Sea, Indian Ocean. *Marine Observer*, 21(154):211–212, Oct. **1951.** fig. **MH-BH**—Brief descriptions of large waterspouts on Oct. 17, 1950, numerous spouts (6 at once) on Dec. 4, 1950, both in Mediterranean, and sketches of spout in Indian Ocean, Oct. 21, 1950. *Subject Headings:* **1. Waterspouts 2. Mediterranean 3. Indian Ocean.** —*C.E.P.B.*

3.2–89 551.515.4

Byers, Horace R., **Thunderstorm structure and circulation.** *International Union of Geodesy and Geophysics, Association of Meteorology, Transactions, Oslo 1948*, Vol. 2:61–64, **1950.** Mimeographed. **DWB**—Thunderstorms usually consist of several more or less independent con-

vective systems each of which manifests a regular development from a cumulus stage through a mature stage to the dissipating stage. Values of entrainment are used to analyze the thermodynamic processes accounting for the observed circulation. The air diverges horizontally under the downdraft of the thunderstorm cell and a high correlation exists between the rate of divergence and the rain intensity. Entrainment aloft arises from horizontal pressure gradients directed inward towards the cell center as well as from frictional effects. A discussion is appended. *Subject Heading:* **1. Thunderstorm dynamics.**—*I.L.D.*

3.2–90 551.515.42:551.571.36

Bider, M. and Thams, J. Chr., **Über die Gewitterwahrscheinlichkeit als Funktion des Dampfdruckes.** [On the probability of thunder storms as a function of vapor pressure.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 3(5):402–407, **1951.** 2 figs., 2 tables. 4 refs. German, English and French summaries, p. 402. **MH-BH**—At 6 European stations, days were classified according to vapor pressure and the percentage of days with thunder heard was calculated for each class. At all, except Milan, the probability of thunder increases rapidly with increasing vapor pressure. The annual variation of the relationship is also discussed. *Subject Headings:* **1. Thunderstorms 2. Vapor pressure.**—*C.E.P.B.*

3.2–91 551.515.8

Scorer, R. S., **Gravity waves.** *Weather*, 6(4):126, April **1951. DWB**—Reply to Morris Tepper (*Weather*, 6(2):62), claiming that perturbation theory of pressure jumps gives accurate results. [*Note:* Letter "Gravity waves" p. 62 was from Morris Tepper, *not* Robert N. Culnan.] *Subject Headings:* **1. Pressure jump 2. Gravity waves.**

RADIATION AND TEMPERATURE

RADIATION

(*See also items:* 3.2–14, 3.2–35, 3.2–58)

3.2–92 551.521:551.311.12

Sauberer, Franz and Dirmhirn, Inge, **Untersuchungen über die Strahlungsverhältnisse auf den Alpengletschern. (Messungen auf dem Hohen Sonnblick im Sommer 1950.)** [Investigations of the radiation conditions on Alpine glaciers. (Measurements on the High Sonnblick in summer 1950.)] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B, 3*:256–269, **1951.** 6 figs., 3 tables, 10 refs. German, English and French summaries p. 256–257. **MH-BH**—Comprehensive measurements were made to determine the radiation balance. Radiation is summarized under the heads: solar radiation (altitude 5–60°), sky radiation in relation to cloud amount, back radiation and albedo of atmosphere, and albedo of glacier, which varied from 0.9 with fine new snow to 0.13 for dirty ice. Long wave radiation from the glacier was not measured but was calculated from air temperature. The diurnal variation and daily radiation balance on cloudless days are calculated for albedo 0.2 to 0.8. *Subject Headings:* **1. Radiation balance 2. Glaciers 3. Sonnblick, Austria.**—*C.E.P.B.*

3.2–93 551.521.1:551.525.2:551.573

Aĭzenshtat, B. A., **O teplovom balanse podstilaiuschcheĭ poverkhnosti v Tashkente.** [On the heat balance of the earth's surface at Tashkent.] *Akademiia Nauk, SSSR, Izvestiia, Seriia Geogr. i Geofiz.*, 15(1):82–86, **1951.** 2 figs., 4 tables, 4 refs. **DWB**—Radiational balance, soil temperature to a depth of 2.7 cm., evaporation and heat exchange between the soil and air were measured over bare ground having an area of 1 hectare. Tables and graphs showing the mean daily march of these components from May to October, the relationships between them and their extreme values are given. *Subject Headings:* **1. Radiation balance 2. Soil temperatures 3. Evaporation 4. Tashkent, U.S.S.R.**—*I.L.D.*

3.2–94 551.521.11

Kaempfert, Wolfgang, **Ein Phasendiagramm der Besonnung.** [Phase diagram for insolation.] *Meteorologische Rundschau*, 4(7–8):141–144, July–Aug. **1951.** 6 figs., 2 tables,

3 refs. **MH-BH**—Tables, and especially diagrams, show the duration of sunshine from a clear sky on streets, or passages between plant rows, of different widths running in different directions. *Subject Heading:* **1. Insolation.**—*C.E.P.B.*

3.2–95 551.521.12:551.521.13:551.521.3

Mörikofer, Walter and Schüepp, Walter, **Aktinometrische Untersuchungen während des Internationalen Polarjahres 1932/1933 auf dem Jungfraujoch (3471 m.).** [Actinometric investigations during the International Polar Year 1932/1933 on the Jungfraujoch (3471 m.).] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B,* 2(5):397–426, **1951.** 11 figs., 9 tables, 31 refs., 15 equations. German, English and French summaries p.397–399. **MH-BH**—Means of solar radiation corrected to Smithsonian scale are given by hour and month and for different air thicknesses and compared with other stations. Diagrams show total, blue-violet, green-yellow and infrared-red. Relations between radiation and water vapor are discussed; owing to purity of the air, variations of radiation are small and mostly due to this factor. Extra-terrestrial radiation above 0.625μ is found to be larger than hitherto supposed and solar constant is calculated as 2.080 cal./cm.^{2}/min. Coefficient of atmospheric turbidity is calculated for different weather conditions at different times of year; it is small. Diurnal variation of intensity of radiation is examined on selected days for 0.35, 0.39, 0.49, 0.69 and 1.45μ. *Subject Headings:* **1. Actinometric data 2. Radiation 3. Solar constant 4. Jungfraujoch, Switzerland.**—*C.E.P.B.*

3.2–96 551.521.13

Nicolet, Marcel, **Sur la détermination du flux énergétique du rayonnement extraterrestre du soleil.** [On the determination of the energy flux of the extraterrestrial solar radiation.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B, 3:*209–219, **1951.** 4 tables, 13 refs. French, German and English summaries p. 209–210. **MH-BH**—In view of recent criticisms of ABBOT's solar constant of 1.94 cal./cm.^{2}/min., author reexamines spectral distribution of solar radiation from photosphere. ABBOT's UV correction is nearly confirmed but his infrared correction of 0.037 is raised to 0.063. A corrected solar constant of 1.98 is obtained which should be used in solar investigations, and a revised table in watts/m^2 from 0.22–7μ to replace LINKE's is given. A new absolute determination is required. *Subject Headings:* **1. Solar constant 2. Solar spectrum.**—*C.E.P.B.*

3.2–97 551.521.16

Albrecht, Fritz, **Intensität und Spektralverteilung der Globalstrahlung bei klarem Himmel.** [Intensity and spectral distribution of global radiation with a clear sky.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B, 3:*220–243, **1951.** 7 figs., 4 tables, 17 refs., 10 equations. German, English and French summaries p. 220–222. **MH-BH**—Author discusses the theory of total radiation from a clear sky and obtains a new complex formula (6) involving, in addition to solar elevation and earth's albedo, a constant depending on back radiation from the atmosphere. This constant is related to absorption by water vapor using observations in Gobi 1931/2, and to diffusion by opaque particles, which are considered to swell at high humidity. He calculated this constant from all available data, equator to pole, and relates values to turbidity factor. There can be large day-to-day changes. The observed spectral distribution of global radiation differs, but not greatly, from the theoretical distribution. *Subject Headings:* **1. Solar radiation 2. Turbidity.**—*C.E.P.B.*

3.2–98 551.521.16

Goldschmidt, Johannes, **Untersuchung zur Globalstrahlung.** [Investigation of global radiation.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B, 3:*244–255, **1951.** 3 figs., 2 tables, 9 equations, 9 refs. English and French summaries p. 244. **MH-BH**—Records of global sun and sky radiation from a Moll-Gorczynski pile at Wahnsdorf are summarized. Values for different sun heights on cloudless days are compared with a simple formula $a_0 \sin h - b_0/\sin h$ and constants determined for each month. Effects of duration of sunshine (% of possible) and cloudiness are then examined; close but not linear relations are found, especially with the former, and expressed as quadratic equations for year, summer and

winter. Duration of sunshine is then introduced in a new, comprehensive formula (9). *Subject Headings:* **1. Global radiation 2. Radiation calculations.**—*C.E.P.B.*

3.2–99 551.521.3

*†Dirmhirn, Inge, **Untersuchungen der Himmelsstrahlung in den Ostalpen mit besonderer Berücksichtigung ihrer Höhenabhängigkeit.** [Investigations of the sky radiation in the East Alps with special regard to its dependence on height.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B,* 2(4):301–346, **1951.** 17 figs., 23 tables, 39 refs. **MH-BH**—Observations at 8 stations (Vienna to Sonnblick) are used to construct an hourly table of scattered sky radiation (mcal./cm.²/min.) for each month, 200–3000 m. on cloudless days. The effect of towns is considered and sky radiation is related to visibility. Radiation from an overcast sky is discussed (middle and high cloud, low cloud, fog); global radiation with cloud amount R is expressed as $Q_R = Q_0[\alpha + (1-\alpha)R]$ and α evaluated as a function of height. A table of hourly sky radiation from overcast sky is constructed for heights 200–3000 m. Global radiation is expressed as in terms of sunshine duration, cloudiness and height. The paper contains much valuable material. *Subject Headings:* **1. Scattering 2. Sky radiation 3. Global radiation 4. Alps.**—*C.E.P.B.*

3.2–100 551.521.32

Sauberer, Franz, **Registrierungen der nächtlichen Ausstrahlung.** [Recordings of nocturnal outward radiation.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B,* 2(4):347–359, **1951.** 6 figs., 3 tables, 8 refs. German, English and French summaries p. 347–348. **MH-BH**—Accurate measurements of effective nocturnal outward radiation were made at Vienna (1948–50) with a black sphere actinograph protected from wind by a fluorite plate. They show a slow decrease during the night, mean values are tabulated for cloudless (0.1305 cal./cm.²/min.) and overcast (0,0243) nights and the relation to cloudiness i is expressed in a formula involving i^2 and i which gives a much better fit than the usual linear relation to i. *Subject Headings:* **1. Outgoing radiation 2. Nocturnal radiation 3. Vienna, Austria.**—*C.E.P.B.*

TEMPERATURE

(*See also items:* 3.2–29, 3.2–62, 3.2–74, 3.2–93, 3.2–142)

3.2–101 551.524

Sandoz, René, **La température à Neuchâtel de 1864 à 1943.** [The temperature at Neuchâtel from 1864 to 1943.] Thesis (M.A.)—Université de Neuchâtel. Neuchâtel, Imprimerie Centrale S. A., **1949.** 215 p. 16 figs., 24 tables, 26 refs. **DLC**—This study covers the following topics: variations of temperature including monthly and daily temperature variation, theoretical analysis of the annual temperature variations, frequency distribution of temperature between observed extremes, amplitude of daily temperature and secular variation of temperature; phenology and thermal climate; frost incidence; the causes of temperature variations including the effect of insolation and wind upon air temperature and thermal influence of the lake and comparison of temperature at Neuchâtel with that of other localities. *Subject Headings:* **1. Temperature variations 2. Neuchâtel, Switzerland.**—*I.L.D.*

3.2–102 551.524:551.586:697

Weston, J. C., **Heat requirements of houses.** *Institution of Heating and Ventilating Engineers, London, Journal,* 18(185):388–398,**1951.** 2 figs., 4 tables, 9 equations. **DLC**—Five types of insulation in four types of houses were tested for loss of heat and regression equations were calculated giving heat loss in terms of floor area and insulation of floors, walls and ceilings, with an allowance for loss by ventilation, etc. This is applied to show the advantages of improved insulation. *Subject Headings:* **1. Indoor temperatures 2. Insulation 3. Industrial climatology.**—*C.E.P.B.*

3.2–103 551.524.1

Arakawa, Hidetoshi and Tsutsumi, K., **Interdiurnal temperature variabilities and temperature singularities in Japan.** *Papers in Meteorology and Geophysics,* Tokyo, 2(1):40–44,

March 1951. 2 figs., tables, 3 refs. In English. **MH-BH**—Data on the interdiurnal variability of air temperature in Japan for the period 1937–1946 are given. The mean interdiurnal variability of air temperature in winter is about 3°C. in central Hokkaido and decreases in all directions to 2°C.–2½°C. along northern coasts. In Japan proper the mean interdiurnal temperature is greatest during March–April. During summer the mean interdiurnal temperature is half that in spring. Also temperature singularities for about 30 stations were studied. *Subject Headings:* **1. Temperature singularities 2. Diurnal temperature variations 3. Japan.**—*I.L.D.*

3.2–104 551.524.7(410)

Dewar, D., **Extreme upper air temperatures over the British Isles.** *Meteorological Magazine*, London, 80(949):200–202, July **1951.** table. **DWB**—Includes table of highest and lowest temperatures recorded by radiosonde from 900 mb. to 40 mb. levels. Lowest reliable value −113°F. at 100 mb.; −121°F. at same level unconfirmed. *Subject Headings:* **1. Upper air temperature extremes 2. British Isles.**—*C.E.P.B.*

3.2–105 551.524.7:551.596.1

Kölzer, Joseph, **Über den Stand der Frage des Schalltransportes auf weite Entfernungen.** [On the state of the problem of sound transmission over long distances.] *Meteorologische Rundschau*, 4(7–8):138–141, July–Aug. **1951.** 5 figs., table, 12 refs. **MH-BH**—Various hypothetical and observed temperature distributions up to 90 km. are discussed. Reconstructions of sound paths from explosions and reflection levels are then considered in relation to temperature distribution. *Subject Headings:* **1. Upper air temperatures 2. Audibility zones.** —*C.E.P.B.*

3.2–106 551.524.36

*Petrovič, Štefan, **O najteplejšie miesto na Slovensku.** [The warmest place in Slovakia.] *Meteorologické Zprávy*, 4(3–4):61–62, **1950.** table. **DWB**—A brief article giving monthly and annual mean temperatures for six stations in Slovakia, showing Bratislava to be the warmest place on the average (1901–1940). Not only does this show up in the average data, but in the actual data for the warmest and coldest months of 1947, 1948 and 1949. *Subject Headings:* **1. Temperature frequencies 2. Slovakia.**—*M.R.*

3.2–107 551.525.6

Van der Merwe, J. H., **The influence of convection on measured borehole temperatures.** *South African Journal of Science*, 47(8):235–237, March **1951.** 2 figs., table, 3 refs. **DWB**—An attempt is made to show that the convection which occurs in mine bores is that which needs the smallest temperature gradient for its excitation and that the average temperature over a bore hole cross section is that of the surrounding rock at the same depth. So, if a large thermometer is used and if stirring of air by the thermometer is allowed for, the temperature will be that of the surrounding rock. *Subject Headings:* **1. Mine temperatures 2. Convection.** —*From author's abstract.*

3.2–108 551.526:551.521

†*Eckel, O. and Reuter, Heinz, **Zur Berechnung des sommerlichen Wärmeumsatzes in Flussläufen.** [On the calculation of summer heat exchange on watercourses.] *Geografiska Annaler*, 32(3–4):188–197, **1950.** 7 figs., 11 tables, refs., equations. **MH-BH**—A detailed analysis of effects of radiation of all types, evaporation, heat exchange (water to air and water to ground) on surface waters, is presented and actual calculations of daily values for a water course are given. Tables and nomograms on which calculations are based are presented as well as theory. Comparison of temperatures at different depths in flowing water under laboratory and field conditions is made. *Subject Headings:* **1. Water temperatures 2. Hydrologic cycle.**— *M.R.*

3.2–109 551.526.6:551.46

Dawson, E. Yale, **A note on the vegetation of a new coastal up-welling area of Baja California.** *Journal of Marine Research*, 9(2):65–68, Oct. 1, **1950.** 3 figs., 4 refs. **MH-BH**—

Temperature sections off coast in 27°–27¼°N. show upwelling cool water. This is supported by marine plants which show a southward extension of their normal range. *Subject Headings:* **1. Sea temperatures 2. Marine algae 3. Oceanography 4. Lower California.**—*C.E.P.B.*

3.2–110 551.526.6:491

Eckel, O., **Die Temperatur des Wiener Trinkwassers.** [The temperature of Vienna drinking water.] *Wetter und Leben*, 3(5–7):113–115, June **1951.** 3 tables. **MH-BH**—Tabulates monthly temperatures of springs and wells at heights of 148–800 m. Means mostly decrease with height; the springs show a very small annual range. *Subject Headings:* **1. Well temperatures 2. Vienna, Austria.**—*C.E.P.B.*

3.2–111 551.526.6:551.465

Wüst, Georg, **Über die Fernwirkung antarktischer und nordatlantischer Wassermassen in den Tiefen des Weltmeeres.** [On the distant effects of Antarctic and North Atlantic water masses in the depths of the world ocean.] *Naturwissenschaftliche Rundschau*, 4(3):97–108, March **1951.** 12 figs., 23 refs. **DWB**—Author summarizes recent data on thermo-haline stratification and builds up a theory of the circulation. Between 50°N. and 45°S. there is a "warm water sphere" 300–1000 m. deep, separated by a discontinuity from the underlying 4000 m. "cold water sphere." The discontinuity comes to the surface in oceanic "polar fronts" which are convergence regions. Below the warm water a layer of minimum salinity spreads equatorwards at 800–1200 m. depth. At the bottom of the oceans the ice cold water from the steep slopes of the Antarctic continent extends to 40–45°N. More saline North Atlantic deep water from the Mediterranean and Greenland spreads south between the two Antarctic layers. The structure is illustrated by meridional sections and the circulation is shown by charts and a block model. *Subject Headings:* **1. Sea temperatures 2. Salinity.**—*C.E.P.B.*

3.2–112 551.526.8

Eckel, O., **Über die Veränderlichkeit und Reduzierbarkeit von Mittelwerten der Fluss- und Seetemperaturen.** [On the variability and reducibility of mean values of river and lake temperatures.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 3:172–188, **1951.** fig., 8 tables, 6 refs. German, English and French summaries p. 172–173. **MH-BH**—Gives for Feb., Aug., year long period mean temperatures, variabilities and probable errors for numerous rivers in central Europe, also monthly means and variabilities of river and lake surface temperatures. The differences between corresponding means are used to discuss how far a series can be corrected to a different period; this is found to be generally practicable for rivers but less so for lakes owing to their abnormal annual variation. *Subject Headings:* **1. River temperatures 2. Lake temperatures 3. Central Europe.**—*C.E.P.B.*

3.2–113 551.526.8:577.3

Pleskot, Gertrud, **Wassertemperatur und Leben im Bach. (Limnologische Studien in den Gebieten der Lunzer Seen und des Wienerwaldes.)** [Water temperature and life in a stream (limnological studies in the region of the Lunz lakes and the Vienna forest).] *Wetter und Leben*, 3(5–7):129–143, June **1951.** fig., 2 tables, 24 refs. **MH-BH**—A survey of the temperatures of a number of streams in relation to the distribution of various water plants and insects. *Subject Headings:* **1. Water temperatures 2. Lakes and rivers 3. Limnology.**—*C.E.P.B.*

3.2–114 551.526.8

Steinhäusser, Hans, **Über die Abkühlungsgrösse in bewegtem Wasser.** [On the cooling power in moving water.] *Meteorologische Rundschau*, 4(3–4):70–71, March–April **1951.** 4 equations. **MH-BH**—Bathers in the nearly stagnant Wörther Lake say that the water feels warmer than in the exit stream. Author examines some engineering formulas for cooling power of water and finds that a flow of 1–5 m./s. should greatly increase cooling power on human body. *Subject Headings:* **1. Cooling power of water. 2. Lakes and rivers.**—*C.E.P.B.*

ATMOSPHERIC PRESSURE AND WIND

PRESSURE

(*See also items:* 3.2–62, 3.2–75, 3.2–121, 3.2–176)

3.2–115 551.541

Dessauer, F., Graffunder, W. and Schaffhauser, J., **Über atmosphärische Pulsationen.** [On atmospheric pulsations.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A,* 3(5):453–463, **1951.** 10 figs., 15 refs. German, English and French summaries p. 453. **MH-BH**—Micro-oscillations of pressure of amplitude .001 to .0001 mm. Hg and period 4–5 secs. at 3 points 660–950 m. apart at Fribourg, Switzerland, were automatically transmitted by radio and recorded on one chart. They were found to travel generally N.W.-S.E. at about 400 m./sec. Wind pressure effects, associated with gusts, interfered with the recordings; methods of minimizing these are discussed. *Subject Headings:* **1. Microvariations of pressure 2. Wind pressure 3. Fribourg, Switzerland.**—*C.E.P.B.*

3.2–116 551.543:551.509.31

*§Fernandez F., Jorge and Whittaker P., Miguel, **Barografía de Chile.** [Barometric pressure in Chile.] *Chile, Oficina Meteorológica de Chile, Publicación* No. 58, **1943.** 90 p. 23 figs., tables. **DWB**—A brief history of meteorological observations in Chile from 1812 to date, indicates that regular reports have been issued since 1869. Average pressure for each month at the various stations and annual variation at each station shown graphically and discussed. Diurnal variations and the effect of pressure in Chile on the general circulation and the prevailing winds are discussed analytically. Many synoptic isobaric charts of southern South America are given for typical and unusual situations. Rules for forecasting from synoptic charts and relation of pressure gradient to wind force shown in a table based on empirical data. Mean monthly pressure data for many stations given for entire period of record, in some cases dating back to 1911. *Subject Headings:* **1. Atmospheric pressure 2. Synoptic forecasting 3. Long period records 4. Chile.**—*M.R.*

3.2–117 551.543.3:519.2

Essenwanger, Oskar, **Beiträge zur Statistik mittellanger Luftdruckwellen in Mitteleuropa.** [Contribution to the statistics of pressure waves of medium length in Central Europe.] *Germany, Deutscher Wetterdienst in der US-Zone, Berichte,* No. 20, **1951.** 20 p. 26 figs., 5 tables, 25 refs. **MH-BH**—Daily pressures at Bamberg 1879–1947 were analyzed for frequency distribution (slightly skew) and for periodicities of 27–36 days, summer and winter half years. In winter, periodicities were found of 28.5 days 1894–1908, 29.5 days 1909-18 with small amplitude, and 30.5 days 1918–1947, all with nearly the same phase each year. In summer there is no constant period. The distribution of the 30.5 day wave over Europe is analyzed in winters 1919/20–1938/39, showing that it travels from W. of Spain to N. Norway, maximum amplitude 1.8 mm. over North Sea. This wave is shown to be related to singularities. *Subject Headings:* **1. Pressure variations 2. Periodicities 3. Central Europe.**—*C.E.P.B.*

3.2–118 551.543.3

Essenwanger, Oskar, **Über Luftdruckwellen von 13 bis 18 Tagen Dauer in Mitteleuropa.** [On pressure waves of 13–18 days length in Central Europe.] *Meteorologische Rundschau,* 4(7–8):129–132, July–Aug. **1951.** 6 figs., 4 refs. **MH-BH**—A periodogram analysis shows in winter but not in summer a maximum amplitude (about 1 mm. Hg) and persistence around 16.5 days. Mean phase and amplitude over Europe 1919/20–1938/39 were plotted, giving a maximum (1.4 mm.) over Scotland and an amphidrome S.W. of Iceland. The persistence ratio: total amplitude/mean amplitude of 10 wave lengths exceeds 0.9 over Central Europe. *Subject Headings:* **1. Pressure waves 2. Europe.**—*C.E.P.B.*

TURBULENCE

3.2–119 551.551:551.557:656.7

Bannon, J. K., **Meteorological aspects of turbulence affecting aircraft at high altitude.** *Great Britain, Meteorological Office, Professional Notes,* No. 104, **1951.** 16 p. 15 tables, 11

refs. M.O. 524d. **DWB**—Gives data of frequency of turbulence and bumpiness in clear air, measured by aircraft at 20,000 to 40,000 ft., both in absolute height and relative to tropopause. Maximum frequency within 1000 ft. of tropopause. Winter worst season. Richardson number and horizontal wind shear were calculated for a number of flights; bumpiness was loosely related to small R_i, large shear and strong winds. A shallow bumpy layer is often found just above tropopause, and in other temperature irregularities. Bumpiness is often associated with jet streams. *Subject Headings:* **1. Upper air turbulence 2. Tropopause 3. British Isles.**—*C.E.P.B.*

3.2–120 551.551:551.557:629.13

§Bannon, J. K., **Severe turbulence encountered by aircraft near jet streams.** *Meteorological Magazine*, London, 80(951):262–269, Sept. **1951.** 4 figs., 2 tables, 8 refs. **MH-BH**—Records of severe turbulence at 30–40,000 ft. over Britain on Nov. 14, 1949 and Nov. 2 and 7, 1950, are tabulated with surface synoptic charts and compared with characteristics of jet stream on same dates. Turbulent areas are shown on a mean cross section of jet for the 3 days; they were nearly all on low pressure side of jet axis. Strong wind shear in the vertical is suggested as the cause. *Subject Headings:* **1. Turbulence 2. Jet stream 3. Aeronautical meteorology.**—*C.E.P.B.*

3.2–121 551.551:551.543:532.517.4

Batchelor, G. K., **Pressure fluctuations in isotropic turbulence.** *Cambridge Philosophical Society, Proceedings*, 47(2):359–374, April **1951.** 3 figs., tables, 16 refs., 67 equations. **DWB**—The correlation is calculated between fluctuating pressures at two points in a field of homogeneous isotropic turbulence. With very large Reynolds numbers the mean-square pressure fluctuation is $0.34\ \rho^2(\bar{u})^2$. The mean-square pressure gradient is evaluated for very small and very large Reynolds numbers and an interpolation formula is devised. The relation between gradient and rate of diffusion from a fixed source is calculated and compared with observations of temperature wake from a line source of heat. *Subject Headings:* **1. Pressure variations 2. Turbulence.**—*C.E.P.B.*

3.2–122 551.551: 532.517.4

Townsend, A. A., **The structure of the turbulent boundary layer.** *Cambridge Philosophical Society, Proceedings*, 47(2):375–395, April **1951.** 12 figs., 13 refs., 8 equations. **DWB**—After a discussion of new ideas in the theory of turbulence, experiments are described in a small wind tunnel. "It is concluded that, most probably in contact with the laminar sublayer, there must be a 'dissipative layer' within which most of the turbulent energy dissipation takes place, and that the bulk of the eddies are, in a sense, attached to the wall and have very high rates of shear in that region." Eddies are very elongated in the direction of the mean stream. *Subject Headings:* **1. Turbulent boundary layer 2. Turbulence theory 3. Wind tunnel experiments.**—*C.E.P.B.*

WIND

(*See also items:* 3.2–37, 3.2–69, 3.2–70, 3.2–119, 3.2–120)

3.2–123 551.552

Lauscher, Friedrich, **Über die Verteilung der Windgeschwindigkeit auf der Erde.** [On the distribution of wind velocity over the earth.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 2(5):427–440, **1951.** 3 figs., 4 tables, 10 refs. German, English and French summaries p. 427–428. **MH-BH**—Begins with a historical summary and a description of the method of preparing charts (based on data by K. Brose, 1936 and W. F. McDonald, 1938). Tables give values for 10° squares and zonal means for sea, land and total, for Jan. and July, and monthly means for windiest places. World Mercator charts show means for Jan. and July. Mean for world (height above ground not stated) 5.85 m./sec. *Subject Headings:* **1. Wind velocity 2. Wind distribution 3. Global circulation.**—*C.E.P.B.*

3.2–124 551.553.2:551.583.14

Ekhart, E., **Der Wind als Klimafaktor und als Indikator für Klimaschwankungen. Zugleich ein Beitrag zur dynamischen Klimatologie.** [The wind as a climatic factor and as

an indicator of climatic oscillations. Also a contribution to dynamic climatology.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 2(3):91–109, **1951.** 10 figs., 3 tables, 6 refs. German, English and French summaries p. 91. **MH-BH**—Tables and diagrams of hourly winds in Vienna 1900–1949 include monthly frequencies of 16 directions, scalar and vector velocities, steadiness and extremes, and vector components of annual variation. The secular variation is discussed on the basis of "random walks" of 5-year means. Data extended back to 1890 show three distinct periods, 1890–1919 (strong, steady from 285°), 1920–1939 (weaker, less steady, 274°), 1940–49 (strong, steady, 287°). Results compared with accidental error. Temperature and precipitation wind roses constructed for seasons and vector wind departures for departures of these elements from normal show good correlation. *Subject Headings:* **1. Wind variations 2. Vectors 3. Vienna, Austria.**—*C.E.P.B.*

3.2–125 551.555:41

Tichy, H., **Moazagotl oder Motzagotel?** *Meteorologische Rundschau*, 4(7–8):152, July–Aug., **1951.** **MH-BH**—Argues that correct spelling and pronunciation is *Motzagotel*. *Subject Headings:* **1. Moazagotl 2. Orthography.**—*C.E.P.B.*

3.2–126 551.556.2:551.584

†Geiger, Rudolf, **Der künstliche Windschutz als meteorologisches Problem.** [Artificial protection from wind as a meteorological problem.] *Erdkunde*, 5(2):106–114, **1951.** 8 figs., 26 refs. **DLC**—A systematic study of the effect of windbreaks. Pt. 1 deals with change of wind field, including roughness and surface turbulence. Windbreaks are regarded as increasing the roughness. Various researches on effect of windbreaks and even a single tree are summarized. Protection of a considerable area is discussed, including spacing of breaks. Pt. 2 discusses effect of changed wind field on microclimate: decrease of evaporation and in general increase of precipitation, formation of snowdrifts, increase of daily range of temperature and of frost danger. *Subject Headings:* **1. Windbreaks 2. Wind protection 3. Microclimatology.**—*C.E.P.B.*

3.2–127 551.557

Reinhard, H., **Höhenwindverhältnisse im Gebiete des Ärmelkanals.** [Upper wind conditions in the region of the English Channel.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, *3*:110–122, **1951.** 8 figs., 4 tables. German, English and French summaries p. 110. **MH-BH**—A study of the winds at 1, 5, 10, 11, 12 km. above Boulogne, Cherbourg and Hook of Holland, obtained by radio direction finding 1941–43. Tables and diagrams show direction and velocity by months and seasons, and discontinuities of direction or speed. Mean winds at 16 km. given. *Subject Headings:* **1. Upper air winds 2. English Channel.**—*C.E.P.B.*

3.2–128 551.557.2(82)

*Schwerdtfeger, Werner, **Ein kleiner Beitrag zur Kenntnis der aerologischen Verhältnisse über dem südlichen Patagonien.** [A small contribution to the knowledge of the aerological conditions over southern Patagonia.] *Meteorologische Rundschau*, 4(7–8):135–138, July–Aug. **1951.** 5 tables, 8 refs. German and English summaries p. 135. **MH-BH**—Seasonal winds at Rio Gallegas (51°40′S., 69°16′W.) and Comodore Rivadavia (45°47′S., 67°30′W.) up to 5000 m. obtained by pilot balloon are compared with radar winds over Falkland Islands. Radiosonde temperatures at Falkland Islands are also discussed. *Subject Headings:* **1. Upper air observation 2. Patagonia 3. Falkland Islands.**—*C.E.P.B.*

AQUEOUS VAPOR AND HYDROMETEORS

EVAPORATION

(*See also items:* 3.2–38, 3.2–90, 3.2–93, 3.2–172)

3.2–129 551.573(267)

Bossolasco, Mario, **Zur Frage der Verdunstung auf dem Meere.** [On the question of evaporation at sea.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, *3*:40–46, **1951.** 16 refs., table, 3 equations. German, English and French summaries p. 40. **MH-**

BH—Monthly evaporation observed at Mogadiscio is compared with that calculated by formulas of JACOBS and SVERDRUP-SAITO. The latter gives annual variation best but amounts are too small. Annual variation of evaporation from Indian Ocean off Mogadiscio is discussed on this basis, giving an excess of 2.5 m./year over precipitation. Evaporation is greatest in Dec.–April, least in S. W. monsoon. *Subject Headings:* **1. Evaporation 2. Indian Ocean.**—*C.E.P.B.*

3.2–130 551.573:551.578.46

Champion, D. L., **Ablation in the Scottish Highlands.** Ashmore, S. E., **Ablation of snow deposits.** *Meteorological Magazine*, London, 80(949):198–199, July **1951.** table, ref. **DWB**—CHAMPION gives table comparing ablation with daily rainfall. ASHMORE agrees that warm rain melts snow. *Subject Headings:* **1. Ablation 2. Snow melt. I. Ashmore, S. E.**—*C.E.P.B.*

3.2–131 551.573:551.578.46

de Quervain, M., **Zur Verdunstung der Schneedecke.** [On the evaporation of snow cover.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B, 3*:47–64, **1951.** 5 figs., 4 tables, 6 refs. German, English and French summaries, p. 47–48. **MH-BH**—Observations of evaporation from snow surface, mainly on Weissfluhjoch (2670 m.) but also at Davos (1550 m.) and summit of Weissfluh (2850 m.), are tabulated, with temperatures of air and snow surface, wind velocity, etc. Observed evaporation agreed well with TRABERT's 1896 formula for wind speeds 0.7 to 3 m./sec. Some observations of diurnal variation are given. Annual variation in sun and shade Jan.–June showed a maximum in May–June. *Subject Headings:* **1. Ablation 2. Weissfluh, Switzerland 3. Davos, Switzerland.**—*C.E.P.B.*

3.2–132 551.573

Ingebo, Robert D., **Vaporization rates and heat-transfer coefficients for pure liquid drops.** *U. S. NACA, Technical Note* 2368, July **1951.** 32 p. diagrs., graphs, tables, 6 refs., equations. **DWB**—The effect of air temperature on vaporization rates of nine pure liquid drops was determined by means of a heat-balance equation. Experimentally evaluated heat-transfer coefficients were found to correlate an expression for relating a new dimensionless number, Re.Sc., and the thermal conductivity ratio k_a/k_v to the Nusselt number of heat transfer. Surface temperatures were determined for the nine pure liquid drops; nitrobenzene, *n*-octane, benzene, methanol, acetone, water, ethanol, butanol and carbon tetrachloride. These temperatures were found to be approximately equal to wet bulb temperatures and a new method of approximating wet bulb temperature from boiling-point data and wet bulb data for water was developed. *Subject Headings:* **1. Evaporation of droplets 2. Heat transfer coefficients.**—*Author's abstract.*

3.2–133 551.573

Thornthwaite, Charles Warren and Mather, John R., **The role of evapotranspiration in climate.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B, 3*:16–39, **1951.** 6 figs., 3 tables, 20 refs. English, German and French summaries p. 16–19. **MH-BH**—Author distinguishes between actual evapotranspiration, limited by moisture available in soil, and potential evapotranspiration. The latter is measured by sunk tanks filled with soil and planted, in which a fixed water table is maintained; 13 are in use. Setup at Seabrook, N. J., is described and vapor profiles above tanks shown. It can also be calculated from climatic data by an empiric formula and examples of annual variation in Europe compared with rainfall are shown. Detailed balance sheets are given for Zurich and Athens, showing "moisture ratio" expressed as (precipitation/evapotranspiration)-1. *Subject Headings:* **1. Evapotranspiration 2. Evaporation measurement 3. Climatic classification.**—*C.E.P.B.*

CLOUD PHYSICS

(*See also items:* 3.2–42, 3.2–49)

3.2–134 551.574.1:621.396.11

Bartnoff, Shepard and Atlas, David, **Microwave determination of particle-size distribution.** *Journal of Meteorology*, 8(2):130–131, April **1951.** 3 refs., 3 equations. **MH-BH**—A pre-

liminary note on the theory leading to research on the usefulness of microwave propagation (attenuation) methods for determination of the liquid water content of clouds and actual drop-size distribution in the cloud. The reflectivity factor $Z=\Sigma N_i d_i^6$ and the audio frequency spectrum $F(w)$ of pulse to pulse fluctuations have been investigated. *Subject Headings:* **1. Microwave propagation 2. Water content of clouds 3. Drop size distribution.**—*M.R.*

3.2–135 551.575.3(42)

*Saunders, W. E. and Summersby, W. D., **Fog at Northolt Airport.** *Meteorological Magazine*, London, 80(951):255–261, Sept. **1951.** 3 figs., 2 tables, 4 refs. **MH-BH**—Tables and diagrams show diurnal and annual variation of fog and thick fog 1946–1950. Fogs are water fogs in summer; in winter smoke from London predominates. Results compared with those for London Airport (*Meteorological Magazine*, 80:9, 1951). *Subject Headings:* **1. Fog frequencies 2. England.**—*C.E.P.B.*

3.2–136 551.575.5(429)

Ashmore, S. E., **Mist scenes on the Clwyd Mountains.** *Weather*, 6(5):158, May **1951.** fig. **DWB**—Account of "beam" of mist in a narrow air current of katabatic origin deflected upwards by topography. *Subject Headings:* **1. Fog 2. Clwyd Mountains, Wales.**—*C.E.P.B.*

3.2–137 551.576:551.574.1(02)

Süring, Reinhard, **Die Wolken.** [The clouds.] *Probleme der kosmischen Physik*, Vol. 16, **1950.** 153 p. photos, diagrs., numerous refs. **MH-BH**—The first edition of this classical treatise was compiled in 1935 and the second edition just before the war. This third edition, which was prepared for publication in May 1949 just before the death of the author, is essentially a review of German literature and knowledge of clouds, cloud forms and cloud physics superimposed on the work of the IMO, such as the International Cloud Atlas. The chapters on peculiar cloud forms (luminous night clouds, mother-of-pearl clouds, twilight cirrus, mammatus formations, orographic clouds, artificial clouds, condensation trails, etc.) and on cloud physics, including optical and electrical phenomena, on relation to radiation, on height and movement of clouds, on daily, annual and regional variations and frequencies, and on observation and photography of clouds are especially interesting. Each chapter contains an extensive bibliography, arranged by subjects. Most of the literature cited is of German origin. *Subject Headings:* **1. Clouds 2. Cloud physics 3. Bibliographies 4. Textbooks.**—*M.R.*

3.2–138 551.576.1:551.515.3

Crosdale, A. L. and Philsbury, R. K., **Funnel cloud at Palisadoes, Jamaica.** *Meteorological Magazine*, London, 80(949):199–200, July **1951.** **DWB**—Description of cone-like appendage from CuNb Dec. 9, 1950. Probably a weak tornado *Subject Headings:* **1. Cumulonimbus clouds 2. Tornadoes.**—*C.E.P.B.*

3.2–139 551.576.12

Alpert, Leo, **Tropical cumulus clouds.** *American Meteorological Society, Bulletin*, 32(5): 192, May **1951.** **MH-BH**—The author asserts that tropical cumuliform clouds are just as "hard" looking in outline as those of higher latitudes under similar atmospheric conditions. *Subject Headings:* **1. Cumulus clouds 2. Tropical meteorology.**

3.2–140 551.576.12(264)

Lamb, D., **Cloud effects, South Atlantic Ocean.** *Marine Observer*, 21(151):12, Jan. **1951.** 3 figs. **DWB**—On March 31, 1950 a shower fell from part of base of a large CuNb., leaving a space "as if part of the cloud had dropped into the sea." *Subject Headings:* **1. Clouds 2. South Atlantic Ocean.**—*C.E.P.B.*

3.2–141 551.576.3:551.590.21

Bouška, Jiří, **Kolísání oblačnosti v Evropě a sluneční činnost.** [Variations of cloud cover in Europe and solar activity.] *Meteorologické Zprávy*, 4(3–4):76, **1950.** 2 figs., 2 refs. **DWB**—Cloudiness data from 47 second order and 34 third order stations in Europe for 1923–1933 (from K. KNOCH) are correlated with solar activity (HELLMANN) to show the similarity in phase, if not in amplitude, of the variations from year to year after solar minima. *Subject Headings:* **1. Cloud variations 2. Solar activity.**—*M.R.*

RAIN

(*See also items:* 3.2–26, 3.2–154, 3.2–171, 3.2–185)

3.2–142 551.577 551.524

*Cambiaso V., Juan B., **I. El regimen pluviométrico in la Isla Hispaniola (Santo Domingo). II. El sistema térmico de la Hispaniola (Santo Domingo).** [Rainfall regime of the island Hispaniola (Santo Domingo). II. Thermal system of Santo Domingo.] *Revista de Agricultura*, Trujillo, 36(063):4–44, Nov–Dec. **1945.** figs., diagrs., tables. **DWB**—A description of the rainfall and air temperature characteristics of Santo Domingo. Monthly rainfall for years between 1935 and 1944, mean monthly rainfall for the interval 1935–1944 and for the period 1935–1939 are given for various stations; also a map showing the distribution of rainfall and a graph of the annual rainfall from 1925 to 1944 are presented. The section on temperature presents histograms of the mean daily temperature for various localities, tables of the mean daily maximum and minimum for the period 1935–1944 and the absolute maxima of temperature for the same period. *Subject Headings:* **1. Precipitation data 2. Temperature data 3. Dominican Republic.**—*I.L.D.*

3.2–143 551.577.11

Jones, R. F., **Rain from non-freezing clouds.** *Meteorological Magazine*, London, 80(951): 273–274, Sept. **1951.** 2 photos. **MH-BH**—On July 18, 1951, in S.E. England, precipitation radar echoes were received from clouds with tops only 1000–8500 ft. These were investigated by aircraft; free air temperature at 7500–8800 ft. 45.7–44.6°F. Some rain reached the ground. Radar photos shown. *Subject Headings:* **1. Rain from nonfreezing clouds. 2. Radar echoes.**—*C.E.P.B.*

3.2–144 551.577.2/3(46)

*†Lautensach, Hermann, **Die Niederschlagshöhen auf der iberischen Halbinsel. Eine geographische Studie.** [The rainfall amounts on the Iberian Peninsula. A geographical study.] *Petermanns Geographische Mitteilungen*, 95(3):145–160, **1951.** 7 charts, 3 tables, 90 refs. **DLC**—A detailed study of the distribution and variations of rainfall based on data for 1111 stations reduced to period 1906–25. The annual means are entered on a large colored chart (1/1,500,000) with isohyets supported by studies of variation of rainfall with height. Another chart shows differences from 1861–1900. Annual variation is shown by histograms, number of dry months, and seasons of greatest rainfall. Weather types and their monthly frequencies are discussed. There is a useful classified bibliography. *Subject Headings:* **1. Precipitation distribution 2. Annual precipitation variations 3. Iberian Peninsula.**—*C.E.P.B.*

3.2–145 551.506.3:551.577.32

*Bergsten, Karl Erik, **Some characteristics of the dispersion of the annual precipitation in Sweden during the period 1881–1940.** *Lund Studies in Geography, Ser. A, Physical Geography*, No. 1, **1950.** 18 p. 4 figs., 10 tables, 11 refs., equations. **DWB**—A statistical analysis of sixty year records (1881–1940) of precipitation in Sweden indicates that the coefficient of variation for the annual precipitation differs in different parts of Sweden, that the median usually has somewhat lower values than the mean, but that the differences are small and negligible except in the coastal regions and that about half of the station have annual precipitations close to the normal frequency curve. *Subject Headings:* **1. Annual precipitation variations 2. Long period records 3. Sweden.**—*I.L.D.*

3.2–146 551.577.37(436)

Held, A., **Beitrag zu einer Definition für Starkregen im Ostalpengebiet.** [Contribution to a definition of heavy rain in the Eastern Alps.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 2(5):448–461, **1951.** 6 figs., 8 tables, 11 refs. German, English and French summaries p. 448–449. **MH-BH**—Various German, English and Alpine curves and formulas, defining rainfall intensity in terms of amount and duration, are discussed. Definitions are then set out for Austria—heavy rain, expected once a year; storm rain (Platzregen) once in 2 years; heavy storm rain once in 8 years. No formula is practicable but a table is given in mm./min. for various Alpine districts for durations 5–120 min. *Subject Headings:* **1. Rain intensities 2. Excessive rainfall frequencies 3. Austrian Alps.**—*C.E.P.B.*

3.2–147 551.577.51

Uttinger, H., **Zur Höhenabhängigkeit der Niederschlagsmenge in den Alpen.** [On the dependence of the amount of rainfall in the Alps on height.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 2(4):360–382, **1951.** 8 figs., tables, 16 refs., equations. German, English and French summaries p. 360–361. **MH-BH**—Criticism of a paper by E. Ekhart (1948). Relations between height (up to 4000 m.) and precipitation are very different in different parts of Switzerland; 4 groups are found and their peculiarities shown. Values of a and b in $N=a-bh$ and correlations between observed and calculated totals are found for different regions and height ranges. As a specific example, precipitation in the Wägital is more closely correlated with distance south (0.92) than with height (0.76). A regression formula is constructed and differences observed-calculated plotted. *Subject Headings:* **1. Orographic influences 2. Rainfall variations 3. Alps.**—*C.E.P.B.*

SNOW

(*See also items:* 3.2–130, 3.2–131)

3.2–148 551.578(02)

Gerdel, Robert W., **Instructions for the determination of snow quality.** *U. S. Corps of Engineers, Cooperative Snow Investigation Program, Technical Memorandums*, No. 1, Jan. **1945.** 11 p. equations. Mimeographed. **DWB**—Instructions contained in this paper are extracted from an article by Bernard and Wilson in the *American Geophysical Union, Transactions* (1941). The equipment to be used, method of calibration, determining calorimeter constant, selecting sampling site, sampling, the gravimetric method of determining snow quality, the volumetric procedure used at remote places where laboratories are not available, the code for recording and sample forms are included in this manual. *Subject Headings:* **1. Snow sampling 2. Observers manuals.**—*M.R.*

3.2–149 551.578.11 551.578.41

Aniol, R., **Über die Temperatur bei fallendem Niederschlag.** [On the temperature during falling precipitation.] *Meteorologische Rundschau*, 4(7–8):147–149, July–Aug. **1951.** 2 figs., 6 tables, 6 refs. **MH-BH**—Tables show for Bremen, Berlin and Munich monthly mean temperature of air with falling rain and falling snow, and air mass with rain and with snow. *Subject Headings:* **1. Rain temperatures 2. Snow temperatures 3. Germany.**—*C.E.P.B.*

3.2–150 551.578.4(43)

Menzl, Oswald, **Die Schneeverhältnisse auf dem Donnersberg.** [Snow conditions on the Donnersberg.] *Meteorologische Rundschau*, 4(7–8):149–151, July–Aug. **1951.** 4 tables, 9 refs. **MH-BH**—Tables give for each winter (Sept.–May) 1905/06–1934/35 amount of snow in mm. and as % of total precipitation, number of days with snow, sequences of consecutive days with snow and number of days with snow cover. *Subject Headings:* **1. Snow 2. Donnersberg, Germany.**—*C.E.P.B.*

3.2–151 551.578.46:551.311.12

Tollner, Hanns, **Über Schwankungen von Mächtigkeit und Dichte ostalpiner Firnfelder.** [On variations of thickness and density of East Alpine firn fields.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B, 3*:189–208, **1951.** fig., 5 tables, 6 refs. German, English and French summaries p. 189–190. **MH-BH**—Observations of variations of depth and density of snow cover on several mountains, 1947–1950, are tabulated in detail. The discussion relates variations to differences of seasonal weather and to exposure to wind and solar radiation. *Subject Headings:* **1. Firn 2. Snow density 3. Alps.**—*C.E.P.B.*

HYDROMETEOROLOGY

(*See also items:* 3.2–45, 3.2–46, 3.2–53 to 3.2–56)

3.2–152 551.579:626.8

Mirtsching, Alex, **Neue Projekte für die Regulierung der Wasserbilanz des Kaspischen Meeres und für die Bewässerung Russisch-Mittel-Asiens.** [New project for regulating the

water balance of the Caspian Sea and for irrigating Russian Central Asia.] *Erdkunde*, 5(1):79-80, 1951. table. **DLC**—A balance sheet of Caspian since 1878 shows an annual loss of 34 mm. or 13.7 km.^{3} water. Author discusses favorably a plan to bring water from the River Obi. *Subject Headings:* **1. Irrigation 2. Hydrology 3. Caspian Sea.**—*C.E.P.B.*

3.2–153 551.579.1

Schiffers, H., **Wasserhaushalt und Probleme der Wassernutzung in der Sahara.** [Water economy and problems of water utilization in the Sahara.] *Erdkunde*, 5(1):51–60, **1951.** 2 figs., fold. chart, table, 33 refs. **DLC**—Includes a brief description of climate with a new map of annual rainfall and a map showing nature of surface, alignment of dunes, various types of oasis, etc. Nearly all the water occurs in depressions dating from the Pluvial Period; many of the oases are being choked by sand but the rainfall is sufficient for regeneration. The underground water system is described, lines of flow in east Sahara indicated and the very considerable resources of the underground reservoirs calculated. *Subject Headings:* **1. Hydrology 2. Sahara Desert.**—*C.E.P.B.*

3.2–154 551.579.4:551.577

Allis, John A., **Results of rainfall and runoff studies.** *Agricultural Engineering*, 31(10):518, 520, 522, 524, Oct. **1950.** 2 figs., tables, 3 refs. **DA**—This article gives the results of studies on rainfall and runoff carried out on an experimental watershed near Rosemont, Webster County, Nebraska. The experimental design is described and data are given on the maximum peak rates of runoff on corn and runoff from areas of various sizes. *Subject Headings:* **1. Runoff 2. Rainfall 3. Rosemont, Nebraska.**—*I.L.D.*

3.2–155 551.579.4

Dalrymple, Tate, **Regional flood frequency.** *National Research Council, Highway Research Board, Research Report*, Washington, D. C., No. 11-B:4–20, **1950.** 8 figs., 3 tables, 16 refs. **DWB**—The procedure employed by the U. S. Geological Survey to analyze stream flow data in order to determine the magnitude and frequency of floods is presented. The methods of computing flood frequencies at a gaging station either by use of normal flood data or by a partial duration series are described. The detailed procedure for determining regional flood frequencies by the use of gaging station records is presented. This regional study by which the flood of ungaged streams can be estimated results in two curves: one representing the ratio of the mean annual flood to a flood of any selected frequency and the other showing the relationship between the mean annual flood and the size of the drainage area. The application of this method to the Maumee River Basin, Ohio, Indiana and Michigan is illustrated. *Subject Heading:* **1. Flood frequencies.**—*I.L.D.*

3.2–156 551.579.4

Flood disaster in Kansas. *Weatherwise*, 4(4):79, 83, Aug. **1951.** fig. **MH-BH**—The Kansas flood of July 1951 was preceded by the heaviest monthly rainfall on record. The average rainfall for Kansas in June was 9.60 inches—5.63 inches above the normal. During June and early July a stationary front, separating cold, polar Canadian air and warm tropical air from the Gulf of Mexico, extended east and west across the state. Also, the air temperature was abnormally low. *Subject Headings:* **1. Floods 2. Rainfall extremes 3. Kansas.**—*I.L.D.*

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATOLOGY

(*See also items:* 3.2–1, 3.2–29)

3.2–157 551.58(26):551.465:525.6

Dietrich, G., **Influences of tidal streams on oceanographic and climatic conditions in the sea as exemplified by the English Channel.** *Nature*, London, 168(4262):8–11, July 7, **1951.** 3 figs., 10 refs. **DLC**—The results of the mixing process caused by tidal streams is shown by a section along the axis of greatest depth in the Channel, giving bottom topography, depth of

thermal discontinuity, temperature, geopotential topography, annual variation of heat content, etc. As a result of the mixing, fog conditions are present in early summer and absent in late autumn. The effects of tidal mixing are increased by the effect of the anomalous heat budget of the water on the circulation. *Subject Headings:* **1. Climatology 2. Ocean currents 3. Marine influences 4. Tides 5. English Channel.**—*C.E.P.B.*

3.2–158 551.58:63

Lossnitzer, H., **Das Klima in der Landschaftskunde.** [Climate in regional geography.] *Baden, Landeswetterdienst, Jahresbericht mit Abhandlungen*, **1950,** p. 53–57. figs. **DWB**—Author argues that the most important factors are temperature and precipitation and he constructs climagrams from monthly data showing accumulated temperature °C. plotted against accumulated rainfall for 11 stations from Arctic to equator (Freiburg, Frankfurt, Catania, Tomsk, Bombay, etc.). *Subject Headings:* **1. Rainfall data 2. Temperature data 3. Regional climatology.**—*C.E.P.B.*

3.2–159 551.582(495)

†Mariolopoulos, Elias G., **E dianomē tōn meteorologikōn stoicheiōn en Helladi.** [Distribution of the meteorological elements in Greece.] *Greece, Ethnikon Asteroskopéion Athnon, Hypomnēmata, Ser.* 2, *Meteorologia*, Arith. 1, **1936.** 173 p. charts, refs., biblio. **DWB**—A scholarly treatise on the various meteorological elements and their distribution in Greece, intended to accompany the Climatological Atlas on Greece (by the same author), but with brief illustrative tables and charts showing roughly the variations in some of the elements in this rugged mountainous country. The elements discussed are: temperature, humidity, clouds, sunshine, rainfall, hail, snow, storms, frequency of winds, air masses, circulation, fronts and pressure. Regional discussions are also included. *Subject Headings:* **1. Climatology 2. Greece.**—*M.R.*

3.2–160 551.582(491)

Rodewald, Martin, **Klima und Wetter der Fischereigebiete Island.** [Climate and weather of the fishery region of Iceland.] Hamburg, Meteorologisches Amt für Nordwestdeutschland, **1951.** 95 p. illus. **DWB**—Review in *Marine Observer*, 21(154):219–220, Oct. **1951. MH-BH**—The first part deals with the climate of the N.W., N.E., S.W., and S.E. fishing banks, the effects of the ocean currents, climatic changes, the influence of Iceland on the wind field and the main weather features and cyclone tracks. A section on climatic variation and ice occurrence advances new ideas on the causes of polar drift ice on northwest edge of Iceland. Various synoptic situations are examined. Appendices discuss weather at times of shipwrecks on S.E. coast, and the stormy weather of 1949. *Subject Headings:* **1. Climatology 2. Ice drift 3. Iceland.**—*C.E.P.B.*

3.2–161 551.582.3(52)

Schwind, M., **Bemerkungen zu neuen Klimakarten Japans.** [Remarks on the new climatic charts of Japan.] *Erdkunde*, 5(3):237–241, **1951.** 6 figs. **DLC**—Review with illustrations and discussion of charts from "The climatographic atlas of Japan" (Central Meteorological Observatory, Tokyo, 1948, 1949), reprinted in Japanese "Geography of social life." *Subject Headings:* **1. Climatic charts 2. Japan.**—*C.E.P.B.*

CLIMATIC CHANGES

(*See also item:* 3.2–124)

3.2–162 551.583

Due Rojo, Antonio, **Sobre la alteración universal de los climas,** [Changes in world climate.] *Euclides*, 11:124–126, March **1951.** Reprint. **DWB**—A brief discussion of climatic changes, cycles, etc. since the dawn of history and analysis of records of temperature, precipitation and sunspot numbers of Cartuja Observatory, Spain, for the period 1902–50, showing fluctuations in these elements. Whereas in the polar regions there has been a systematic warming-up and in the tropics and subtropics a cooling-off; in Spain the first part of

the century was less variable than the seasonal quarter but not much different in the mean. *Subject Headings:* **1. Climatic variations 2. Granada, Spain. I. Cartuja Observatory.**—*M.R.*

3.2–163 551.583.14(74)

Landsberg, Helmut, **Some recent climatic changes in Washington, D. C.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B, 3*:65–71, **1951.** 3 figs., 3 tables, 7 refs. English, German and French summaries p. 65–66. **MH-BH**—From 1891/1900 to 1941/50 annual frequency of cloudy days increased by 36, of clear days decreased by 57, change shown in all months. Reality probable statistically and borne out by other evidence. In same period temperature increased and relative humidity decreased. Change of cloudiness shared by rural stations and due to a more maritime climate rather than growth of city. *Subject Headings:* **1. Climatic variations 2. Cloudiness 3. Washington, D. C.**—*C.E.P.B.*

3.2–164 551.583.14:551.501.45

van den Bijl, W., **Methodical considerations on the statistical operations concerning climatic variations. An elaboration of some critical remarks on "Recent climatic fluctuations" by L. Lysgaard.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B,* 2(5):468–485, **1951.** 3 figs., table, 5 refs. English, German and French summaries p. 468–469. **MH-BH**—Summarizes at length LYSGAARD's 1949 book (*see item* 6–86 in June 1950 *Meteorological Abstracts*) on overlapping climatic series. The high correlation coefficients are criticized because no correction was made for smoothing and discrepancies are pointed out. The smoothed temperature variations at Copenhagen are compared with the same data taken in 10 different random orders. It is inferred that the amelioration since 1866 is probably real. *Subject Headings:* **1. Climatic changes 2. Reviews 3. Lysgaard, Leo.**—*C.E.P.B.*

3.2–165 551.583.3:551.4

Büdel, Julius, **Klima-morphologische Beobachtungen in Süditalien (Vorbericht, Beiträge zur Geomorphologie der Klimazonen und Vorzeitklimate VI).** [Climato-morphological observations in southern Italy (Preliminary report, Contributions to geomorphology of climatic zones and former climates VI).] *Erdkunde,* 5(1):73–76, **1951. DLC**—On a journey in southern Italy and Sicily author studied land forms in relation to Quaternary and postglacial climatic changes. *Subject Headings:* **1. Geomorphology 2. Italy 3. Sicily.**—*C.E.P.B.*

3.2–166 551.583.3

Thiel, E., **Die Eiszeit in Siberien. Teil 1–3.** [The ice age in Siberia. Pts. 1–3.] *Erdkunde,* 5(1):16–35, **1951.** 4 charts, 84 refs. **DLC**—These parts deal with the glaciation of Siberia and the Quaternary history of the Siberian flora and fauna. Charts show the limits of glaciation as a whole and local details. The maximum glaciated area was about 4000 sq. km., mean ice thickness only 500–800 m. Central Siberia was mainly ice-free; east Siberia had mountain glaciers. The analysis of the Quaternary climate is to follow in Pt. 5. *Subject Headings:* **1. Quaternary climates 2. Glacial periods 3. Siberia, U.S.S.R.**—*C.E.P.B.*

MICROCLIMATOLOGY

(*See also item:* 3.2–126)

3.2–167 551.58:63 551.584:016

†Germany. Deutscher Wetterdienst in der US-Zone, **Agrarmeteorologische Bibliographie 1949. 1. Teil.** [Agro-meteorological bibliography 1949. Pt. I.] Bad Kissingen, **1950.** 229 p. **DWB**—This annotated bibliography of agricultural meteorology is a continuation of the agricultural meteorological bibliography issued by the German weather service up until 1941. This first volume contains all accessions received by the German weather service in the U. S. Zone between Jan. 1 and July 1, 1949 and also important items of earlier date going as far back as 1941. The subject matter covered is divided into the following subdivisions, viz.: 1) local climate, microclimate and crop climate; 2) weather, climate and soil; 3) weather, climate and plants; 4) weather, climate and agriculture; 5) weather, climate and plant diseases; 6) weather, climate and animals; 7) apparatus and methods of investigation; 8) important

publications in neighboring scientific disciplines. *Subject Headings:* **1. Agricultural meteorology 2. Bibliographies.**—*I.L.D.*

3.2–168 551.584.31

Aichele, H., **Frostgefährdete Gebiete in der Baar, eine kleinklimatische Geländekartierung.** [Regions of the Baar liable to frost, a microclimatological mapping.] *Erdkunde*, 5(1):70–73, **1951.** 2 figs., 15 refs. **DLC**—The Baar is a high level trough open to the north between the Black Forest and Swabian Jura, very susceptible to frosts. Two summer frosts were charted in terms of slight, moderate and severe damage to potato crop. Upper limit of cold air on radiation nights was mapped from ground fog layer and temperature stratification investigated with a meteorograph. The map was completed from effects on frost-susceptible *honey grass*, and shows effects of contours very clearly. It has been used for agricultural planning. *Subject Headings:* **1. Microclimatology 2. Frost damage 3. Germany.**—*C.E.P.B.*

3.2–169 551.584.4

Ramdas, L. A., **Micro-climatological investigations in India.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B, 3*:149–167, **1951.** 13 figs., 6 tables, 42 refs. English, German and French summaries p. 149–150. **MH-BH**—First describes experiments with a hot plate, distinguishing a shimmering layer below an eddying layer, and a mirage in lowest few mm. Then gives temperatures at 0–900 cm. above bare soil at Poona, showing lapse rates up to 2×10^6°C./km. in lowest cm. Fluctuations of temperature in shimmering layer observed with minute thermocouples showed a range of 5°C. at 1 inch decreasing to 2° at 35 ft. (extrapolated to zero at 150–200 ft.). Diurnal variation in soil and air set out. The growth of the thermal inversion on clear nights and its decay after sunrise, transmission of heat by convection from ground to air, and exchange of water vapor are briefly discussed. A negative correlation between gradients of temperature and wind speed increases upwards. Finally, microclimates of plant communities are examined, including diurnal variation, wind velocity and evaporation. *Subject Headings:* **1. Microclimatology 2. Vertical temperature gradient 3. Mirages 4. India.**—*C.E.P.B.*

CLIMATIC CLASSIFICATION

3.2–170 551.585(762)

†Aubréville, André, **Climats, forêts et désertification de l'Afrique tropicale.** [Climates, forests and increasing aridity of tropical Africa.] Paris, Société d'Éditions Geographiques Maritimes et Coloniales, **1949.** 351 p. figs., tables, biblio. p. 345–351. **DWB**—A monumental work in some ways similar to that of Étienne Bernard for the Belgian Congo (*see item* 8–110 in Aug. 1950 *Meteorological Abstracts*), making use of a great mass of climatic data for all of tropical (West, Central and East) Africa and Madagascar. All of the systems of climatic classification are reviewed and examples worked out and charts, tables, etc. presented. However, the various weather elements are considered individually for each section and a warning given against indiscriminate use of classifications or analogs. The data and discussion are all centered around effect of climate, etc. on forests and on land use. *Subject Headings:* **1. Climatic classification 2. Plant ecology 3. French Equatorial Africa.**—*M.R.*

3.2–171 551.585:551.577.5

†Gentilli, J., **The measurement of precipitation effectiveness.** *Scope*, 1(5):43–48, July **1950.** equations, biblio. Reprint. **MH-BH**—Lists a number of formulas, beginning with r mm./t°C., where r and t are monthly or annual rainfall and temperature and including Köppen's $r/(t+a)$, where a varies with season, formulas involving maximum and minimum temperature, number of wet days, Gorczynski's aridity function involving latitude and functions of humidity and evapotranspiration. There is a useful bibliography of 41 items. *Subject Heading:* **1. Precipitation effectiveness.**—*C.E.P.B.*

3.2–172 551.585:551.573:634.9(71)

Hare, F. Kenneth, **Climate and zonal divisions of the boreal forest formation in eastern Canada.** *Geographical Review*, 40(4):615–635, Oct. **1950.** 12 figs., 3 tables, 38 refs. **DLC**—First the forests and tundra areas of Canada near and east of Hudson Bay are classified accord-

ing to a system devised by HUSTICH for Scandinavia and Labrador. The discussion of climatic relations is based on THORNTHWAITE's 1948 system. Charts of thermal efficiency and moisture index are shown for eastern Canada. A valuable list of climatological stations which gives coordinates, elevation and period of record is appended. *Subject Headings:* **1. Climatic regions 2. Potential evapotranspiration 3. Forests 4. Ecology 5. Canada.**—*M.R.*

3.2–173 551.585(84)

Prada Estrada, Roberto, **Climas de Bolivia.** [Climates of Bolivia.] La Paz, **1948.** 52 p. tables, charts. **DWB**—Following an introduction on the importance of climate, the author describes each of the following climatic factors: temperature, rainfall, pressure and wind, humidity, cloudiness and insolation. The systems of climatic classification of KÖPPEN, DE MARTONNE and THORNTHWAITE are summarized. THORNTHWAITE's classification, as modified by CONTRERAS ARIAS, is the basis of a study of the climates of Bolivia. The study shows temperature and humidity according to specified class intervals and temperature and humidity distribution. Four charts illustrate this study. A table presents monthly and annual average temperature for 42 stations. Coordinates for each station are given, but not the dates of the period of record. In most cases, the period is probably not more than three years. The climate at each station is classified and briefly described. A chart shows the classification of the climate of Bolivia according to THORNTHWAITE. *Subject Headings:* **1. Climatic classification 2. Bolivia. I. Bolivia. Servicio Meteorológico, División de Climatología.**—*M.L.R.*

BIOCLIMATOLOGY

(*See also items:* 3.2–14, 3.2–102)

3.2–174 551.586:551.590.2

Berg, Hellmut, **Kosmische Einflüsse auf den Organismus.** [Cosmic influences on the organism.] *Annalen der Meteorologie, Medizin-meteorologische Hefte*, No. 5:1–17, **1951.** 16 figs., 23 refs. **MH-BH**—1. The daily period in biological processes, discusses photoperiodicity in plants, whether the 24-hour biological rhythm is endogenous or depends on external stimuli (unsolved), and existence of other rhythms (48–6 hours). 2. Effect of solar rotation in biological processes, reports no evidence of 27-day recurrences. 3. Lunar periodic influences, discusses relation of menstruation to new and full moon, beginning of birth labor to tides, etc. (not definite). 4. The 11-year sunspot period, includes tree-rings, migrations and incidence of cholera, small-pox and meningitis. 5. Release of biological events by individual cosmic processes, discusses relations of magnetic character figures to convulsions and embolism. Finally, 6. The working mechanism, considers possible biological effects of highly variable long-wave solar radiation. *Subject Headings:* **1. Bioclimatology 2. Cosmic influences.**—*C.E.P.B.*

3.2–175 551.586:551.590.21

Takata, Maki, **Über eine neue biologisch wirksame Komponente der Sonnenstrahlung. Beitrag zu einer experimentellen Grundlage der Heliobiologie.** [On a new biologically effective component of solar radiation. Contribution to an experimental basis of heliobiology.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 2(5):486–508, **1951.** 10 figs., 19 refs. German, English and French summaries p. 486–488. **MH-BH**—Author describes a corpuscular radiation which can only be detected by its power of ionizing and causing flocculation of blood serum. Method of examining blood samples described. Observations in distant places agree. Observations 1935–1949 show systematic increase at sunrise and decrease at sunset and during solar eclipse, increase with decreasing latitude and marked parallelism with sunspot curve (11-year and 27-day recurrences). Observations in aircraft show that it increases rapidly with elevation. It is compared with effect of artificial bombardment by neutrons (neutrinos). *Subject Headings:* **1. Medical meteorology 2. Solar influences 3. Physiology.**—*C.E.P.B.*

3.2–176 551.586:612:551.543:551.594.11

Courvoisier, P., **Die Bedeutung von Schwankungen des Luftdruckes und des elektrischen Feldes für die Erklärung der Wetterfühligkeit.** [The importance of variations of atmospheric

pressure and of the electrical field for the explanation of weather sensitiveness.] *Annalen der Meteorologie, Medizin-meteorologische Hefte*, No. 5:20-22, **1951.** 4 refs. **MH-BH**—A summary of author's comparisons of "spectra" of frequency and amplitude of changes of pressure and electrical field with observations of weather sensitiveness. The range of effective variations has been defined but no specially effective factor has yet been isolated. *Subject Headings:* **1. Medical meteorology 2. Pressure changes 3. Electrical phenomena 4. Weather sensitivity.**—*C.E.P.B.*

3.2–177 551.586:612

Lauscher, Friedrich, **Über die Verteilung der HILLschen Abkrühlungsgrösse auf der Erde.** [On the distribution of Hill's cooling power over the earth.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 3:275–388, **1951.** 4 figs., 3 tables, 4 refs. German, English and French summaries p. 275–276. **MH-BH**—Using HILL'S formula $H=(0.13+0.47v^{0.5})(36.5-t)$, HANN-SÜRING'S world temperature charts and his own values of wind speed, author calculated cooling power for each strip 10° lat.×20° long., for Jan. and July. Values are shown in tables and world charts. Mean values: Northern Hemisphere Jan. 32.7 mg. cal./cm.²/sec., July 16.5; Southern Hemisphere Jan. 26.2, July 36.2; world year 27.9. Peculiarities of the distribution are discussed. *Subject Headings:* **1. Bioclimatology 2. Cooling power.**—*C.E.P.B.*

3.2–178 551.586:612:599.9

†Mitchell, Harold Hanson and Edman, Marjorie, **Nutrition and resistance to climatic stress with particular reference to man.** Chicago, Quartermaster Food Container Institute for the Armed Forces, Nov. **1949.** 112 p. 2 tables, refs. p. 75–112. **MH-BH**—This is a comprehensive and critical review of the literature dealing with the effect of nutrition upon man's resistance to the stress of cold, hot and high altitude environments; also studies on the effect of diet upon the heat tolerance of livestock are reviewed. The following topics are considered: the physiological effects of cold, heat and of high altitude, the effects of these environments upon nutrient requirements as determined by means of animal experiments and by experiments on human beings; the effect of diet in tolerance to these environmental stresses as shown by experiments on animals and human beings and the effect of drugs upon altitude tolerance. *Subject Headings:* **1. Bioclimatology 2. Acclimatization 3. Dietetic influences. I. U. S. Quartermaster Corps.**—*I.L.D.*

3.2–179 551.586:612

U. S. Quartermaster Corps. Environmental Protection Section, **China and Korea.** *Clothing Almanac*, Washington, D. C., No. 10, April **1951.** 56 p. 3 figs., fold. chart. **DWB**—General discussion of climate of various zones of China and Korea as shown on chart. Effect of climate on clothing requirements and actual requirements for these zones. *Subject Headings:* **1. Bioclimatology 2. Clothing requirements 3. China 4. Korea.**—*M.R.*

3.2–180 551.586:612.126:612.39:575.34

†Sargent, F., **A critique of homeostasis: season and metabolism.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 3:289–296, **1951.** 37 refs. English, German and French summaries p. 289–290. **MH-BH**—A study of the conflicting literature on seasonal variations of phosphorus and calcium in the blood, and of occurrences of tetany and rickets. Author considers that the composition of the fluid bathing the body cells is not independent of external conditions. *Subject Headings:* **1. Medical climatology 2. Tetany 3. Rickets.**—*C.E.P.B.*

3.2–181 551.586:616

Phillips, Charles, **Climate and skin cancer.** *American Meteorological Society, Bulletin*, 32(5):186–188, May **1951.** 11 refs. **MH-BH**—The relationship between exposure to sunlight and incidence of skin cancer, the effect of sunlight upon skin, the incidence of skin cancer in the United States and in the Southwest are discussed briefly. *Subject Headings:* **1. Medical climatology 2. Skin cancer 3. United States.**—*I.L.D.*

3.2–182 551.586:628.8

Tikhomirov, K. V., **Luchistoe otoplenie v istorii razvitiia otopitel'no-ventiliatsionnoĭ tekhniki.** [Radiant heating in the history of the development of heating and ventilating technique.] *Gigiena i Sanitariia*, Moscow, No. 5:9–15, May **1951.** 3 figs. **DLC**—The development of scientific heating and ventilating techniques and of radiant heating methods, which take into account physiological comfort, in Russia from 1745 to the present is discussed. The names of the various investigators are listed. The discussion slights the advances that have been made in this field in other countries. *Subject Headings:* **1. Bioclimatology 2. Heating and ventilating 3. Radiant heating.**—*I.L.D.*

3.2–183 551.586:551.43:63

Monheim, F., **Beobachtungen über die Getreidegrenze und Feldsysteme der französischen und schweizer Hochalpen.** [Observations on the limits of cultivation and field systems of the French and Swiss High Alps.] *Erdkunde*, 5(2):157–165, **1951.** 8 figs., table. **DLC**—Discusses: 1) the height limits of Alpine agriculture in relation to climate, duration of snow cover, and rock structure; 2) the effect of the short growing season and 3) the field system necessitated by the rapid transition from one climate to another. *Subject Headings:* **1. Agricultural climatology 2. Alps.**—*C.E.P.B.*

MISCELLANEOUS APPLICATIONS

SOLAR INFLUENCES

(*See also items:* 3.2–141, 3.2–174, 3.2–175)

3.2–184 551.590.21

Haurwitz, Bernhard, **Symposium: The influence of solar phenomena on the weather.** *New York Academy of Sciences, Transactions, 2nd Ser.*, 13(7):276–277, May **1951. DLC**—A brief discussion of the present status of theoretical work on the relation between solar radiation variations (sunspots, etc.) and the general circulation as influenced by the ozonosphere, ionosphere or actual changes in the energy balance of the troposphere. Papers read at this session (Jan. 29, 1951) by Willett, Craig, H. Wexler and R. Penndorf are summarized very briefly. *Subject Headings:* **1. Solar influences 2. Symposia.**—*M.R.*

3.2–185 551.590.21:551.577.31

Křivský, Lad., **Chromosférické erupce a denní atmosférické srážky v Praze v letech 1947 a 1948.** [Chromospheric eruptions and daily atmospheric precipitation in Prague in 1947 and 1948.] *Meteorologické Zprávy*, 4(3–4):75, **1950.** fig., 2 tables, 5 refs. **DWB**—Correlations shown graphically, based on data for 1947 and 1948. Brief text. *Subject Headings:* **1. Solar influences 2. Diurnal rainfall variations 3. Prague, Czechoslovakia.**—*M.R.*

3.2–186 551.590.21:551.510.5

Penndorf, Rudolf, **Some notes concerning the relationship between solar phenomena and weather.** *New York Academy of Sciences, Transactions, 2nd Ser.*, 13(7):287–290, May **1951.** 3 tables, 8 refs. **DLC**—In looking for some mechanism through which solar activity could influence the weather in the troposphere, several hypotheses are examined. It is concluded from data obtained at Arosa that the total amount of ozone does not follow any solar cycle and that solar radiation does not change appreciably in the UV between 1200Å and 3000Å where ozone is produced. The only alternative is that there is some *ionospheric* influence on the troposphere and this has not yet been established. More data are necessary to prove any of the above relationships. *Subject Headings:* **1. Solar influences 2. Ozone 3. Weather.**—*M.R.*

3.2–187 551.590.21:551.311.13

Willett, H. C., **Solar influences on the weather.** *New York Academy of Sciences, Transactions, 2nd Ser.*, 13(7):277–280, May **1951.** 8 refs. **DLC**—This article comprises a short review of three recent studies on the relation between solar activity and current or past (glacial period) weather. The first study mentioned is that by Duell and Duell (1948) on the

behavior of pressure a given number of days after solar disturbances. This is purported to be the first study to demonstrate any short range response of the atmosphere to solar disturbances. The ideas of the author on the relation between anomalies of pressure, temperature and rainfall and sunspot maxima or minima are revised in the light of studies of glaciation by REX and THORARINSSON. The most recent conclusions of the author, based on weather patterns of the past 2 centuries, are enumerated and a paper by BODURTHA on anticyclogenesis in Alaska is summarized. *Subject Headings:* **1. Solar influences 2. Glaciation 3. General circulation.**—*M.R.*

OPTICAL PHENOMENA

3.2–188 551.593.1:522

Socher, H., **Brechzahl und Refraktion der atmosphärischen Luft.** [Refractive index and refraction of atmospheric air.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B, 3*:270–274, **1951.** 2 tables, 10 refs. German, English and French summaries p. 270. **MH-BH**—Author recalculated P. HARZER's 1924 tables of the refraction constant for astronomical use for determinations by H. BARRELL and J. E. SEARS (1939) for 500–600μ. A table of corrections for the most effective visual wave lengths of 5 spectral types of stars is included. *Subject Headings:* **1. Atmospheric refraction 2. Astronomy.**—*C.E.P.B.*

3.2–189 551.593.11

Abnormal refraction. Red Sea. *Marine Observer*, 21(154):213, Oct. **1951.** 2 figs. **MH-BH**—Sketches of peculiar deformations of a ship seen from 30 miles on Dec. 6, 1950. Air temperature 75°, sea 78°. *Subject Headings:* **1. Mirages 2. Red Sea.**—*C.E.P.B.*

3.2–190 551.593.6 551.594.5

Novikova, N. G., **"Neobyknovennye" nebesnye iavleniia.** [Unusual sky phenomena.] Moscow, Gosizdat., **1950.** 64 p. 32 figs., refs. **DLC**—A popula. exposition of the nature and causes of many natural phenomena which have been considered to be "miraculous" by uninformed or superstitious people. Some of these are: auroras, rain of frogs, fish, etc.; optical phenomena such as rainbows, halos, sun dogs and mirages; comets, meteors and eclipses. Many schematic diagrams or drawings are included to illustrate the various phenomena. *Subject Headings:* **1. Optical phenomena 2. Auroras 3. Weather lore.**—*M.R.*

ELECTRICAL PHENOMENA

(*See also items:* 3.2–60, 3.2–176, 3.2–190)

3.2–191 551.594

Godard, Louis and Lafargue, Camille, **Sur un procédé de mesure des charges portées par de fines particules électrisées.** [On a procedure for measuring the charge carried by small electric particles.] *Académie des Sciences, Paris, Comptes Rendus*, 231(16):786–787, Oct. 16, **1950. DWB**—The electrified particles (fog, rain or aerosols) are collected in a liquid of known viscosity, placed between the two vertical armatures of a plate condenser. The armatures are attached to constant potentials and the displacement of a particle exposed to the influence of the electric field during a given time is measured by means of a microscope with an ocular micrometer. *Subject Headings:* **1. Atmospheric electricity measurement 2. Ionization.**—*I.L.D.*

3.2–192 551.594

Meinhold, Heinz, **The wave form of atmospherics.** *Geofisica Pura e Applicata*, 19(3–4): 173–175, **1951.** 2 figs., 5 refs., equations. In English, English and German summaries p. 173. **MH-BH**—Measurement of frequency distribution of sferics from lightning strokes a hundred kilometers away shows that the empirical wave form can be obtained by propagation mechanisms near the ground (excluding reflections from the ionosphere), wherein the higher frequencies are damped out. Also the wave form of the original lightning stroke cannot be determined from the wave form of the sferics. *Subject Headings:* **1. Sferics 2. Lightning waves.**—*M.R.*

3.2–193 551.594.2:551.515(09)

Spirhanzl, Jar., **Okolo hromů, blesků a bouří.** [Thunder, lightning and storms.] *Meteorologické Zprávy*, 4(3–4):77–78, **1950. DWB**—Brief discussion of research and theories on origin of electric fields, discharges and phenomena connected with thunderstorms. Work of V. I. ARABADZHI (1950) is cited as well as historical investigations of LOMONOSOV, FRANKLIN, WILSON and others in France, Germany, Italy, etc. and even sixteenth and seventeenth century experiments mentioned. *Subject Headings:* **1. Thunderstorm electricity 2. Lightning 3. History of meteorology.**—*M.R.*

3.2–194 551.594.221(42)

Harvey, J. B., **An historic storm.** *Weather*, 6(5):159–160, May **1951. DWB**—Extracts describing a violent thunderstorm in East Suffolk, Aug. 4, 1557. *Subject Headings:* **1. Thunderstorms 2. Lightning 3. Suffolk, England.**—*C.E.P.B.*

3.2–195 551.594.21

Kumm, A., **Über die Entstehung von elektrischen Ladungen bei Vorgängen in der kristallinen Eisphase.** [On the origin of electric charges by processes in the crystalline ice phase.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 3(5):382–401, **1951.** 5 figs., 2 tables, 13 refs. German, English and French summaries, p. 382–383. **MH-BH**—A laboratory examination of results by W. FINDEISEN (*Meteorologische Zeitschrift* 1940, 1943) does not confirm them. Rime was formed on an upper cold hemispherical surface, from which particles fell off under certain conditions such as variations of temperature. Charges on these particles were studied; they increased rapidly in frequency from 25×10^{-15} coulomb to 3.5×10^{-15} more slowly to 3.3×10^{-16}, then remained constant. Mean charge 7×10^{-16}. At all levels +charges are 7–8 times as frequent as − charges. A possible new explanation is discussed, based on polarity of ice needles. The charges developed are too small to account for electricity of thunderstorms. *Subject Headings:* **1. Thunderstorm electricity 2. Ice crystals 3. Rime.**—*C.E.P.B.*

3.2–196 551.594.5

O'Neill, Harold Edgar, **The auroral drama.** Aurora, Missouri, Burney Bros., **1937.** 327 p. **DLC**—A carefully compiled collection of facts and opinions regarding the aurora, taken from personal experience and from contacts with numerous authorities on the Arctic and Antarctic, on meteorological and atmospheric electricity phenomena. Much is in the category of adventure rather than science, but the material is systematically organized and the opinions carefully weighed. *Subject Headings:* **1. Auroras 2. Arctic 3. Antarctic.**—*M.R.*

3.2–197 551.594.6

Blum, Émile-Jacques; Denisse, Jean-François and Steinberg, Jean-Louis, **Étude des orages radioélectriques solaires de faible intensité.** [Study of solar radioelectric storms of weak intensity.] *Académie des Sciences, Paris, Comptes Rendus*, 232(5):387–389, Jan. 29, **1951.** 3 figs., ref. **DWB**—A study of solar radioelectric storms of low intensity which were observed upon a frequency of 164 Mc./sec. has revealed that days of low activity are characterized by the appearance of jumps of given amplitude and duration. It is asserted that intense radioelectric solar storms are produced by the superposition of jumps. *Subject Headings:* **1. Sferics 2. Solar radioelectric storms.**—*I.L.D.*

3.2–198 551.594.6

Broc, Jean, **Observation d'échos de radar d'une région sans nuages.** [Observation of radar echoes in a cloudless region.] *Académie des Sciences, Paris, Comptes Rendus*, 232(22): 2034–2036, May 28, **1951.** 2 photos. **DWB**—A description and photographs of radar echoes received from the lower levels of the atmosphere in the absence of clouds. *Subject Headings:* **1. Radar echoes 2. Cloudless regions 3. Monaco 4. Mediterranean.**—*I.L.D.*

3.2–199 551.594.6

Carbenay, Fernand, **L'action statistique des atmosphériques sur un recepteur accordé sur 27 kc./sec.** [Statistical action of atmospherics upon a receiver tuned to 27 kc./sec.]

Académie des Sciences, Paris, Comptes Rendus, 232(10):949–950, March 5, **1951.** fig., 4 refs. **DWB**—*Subject Headings:* **1. Sferics 2. Radio reception.**

3.2–200 551.594.7:551.515.8

Karp, Samuel and Sollfrey, William, **Diffraction by a dielectric wedge; with application to propagation through a cold front.** *New York University, Mathematics Research Group, Research Report* No. EM-23, Oct. **1950.** 45 leaves. 13 figs., 10 refs., 7 equations. Mimeographed. **DWB**—The fields diffracted by a dielectric wedge whose dielectric constant differs but slightly from that of its surroundings have been obtained by an approximate method. The fields are expanded in powers of the difference in dielectric constant and only first powers are retained. The approximate fields are then represented as a superposition of plane waves of arbitrary complex direction of propagation, and the resulting integrals evaluated by stationary phase to obtain the asymptotic form of the scattered fields. The reflected and transmitted plane waves agree with those obtained by geometrical optics, and the angular pattern of the diffracted cylindrical waves is found. The results are applied to the propagation of plane waves through a cold front. *Subject Headings:* **1. Electromagnetic waves 2. Dielectric wedge 3. Cold fronts.**—*Author's abstract.*

3.2–201 551.594.7

Pickard, Greenleaf W. and Stetson, Harlan T., **Comparison of tropospheric reception at 44.1 mc, and at 92.1 mc, over the 167 miles path, Alpine, New Jersey to Needham, Massachusetts 1947–1948.** *Journal of Atmospheric and Terrestrial Physics*, 1(1):32–36, **1950.** 4 figs., 2 refs. **MH-BH**—Daily and hourly field intensities of transmissions show close correlation with index of refraction of radio waves computed from pressure, temperature and humidity at Boston, Mass. Frequency distribution of reception in decibels is analyzed. Transmission is mainly due to refraction in the lower atmosphere. *Subject Heading:* **1. Radio transmission.** —*C.E.P.B.*

3.2–202 551.594.6

Stoyko, Anna, **Sur la variation de la vitesse de propagation des ondes radioélectriques.** [Variation of the velocity of propagation of radioelectric waves.] *Académie des Sciences, Paris, Comptes Rendus*, 232(21):1916–1918, May 21, **1951.** table, 2 refs. **DWB**—The author shows that the apparent speed of the propagation of radioelectric signals is normally much less than the speed of echoes around the earth and this speed is variable. *Subject Headings:* **1. Radio wave propagation 2. Radio echoes.**—*I.L.D.*

ACOUSTICAL PHENOMENA

(*See also item:* 3.2–105)

3.2–203 551.596:534(02)

Trendelenburg, Ferdinand, **Einführung in die Akustik.** [Introduction to acoustics.] 2nd ed. Berlin, Springer-Verlag, **1950.** 378 p. 280 figs., 28 tables, numerous refs., equations, append. **MH-BH**—A modern and highly technical text on acoustics with great emphasis on the theory of wave propagation in various media. In Chap. II, variations of wave form and speed with changes in temperature and pressure are taken up. In Chap. IV, Par. 22 deals with the influence of atmospheric temperature and wind lapse rate or discontinuities on propagation and refraction of sound waves, anomalous zones of audibility and stratospheric reflection. The text is amply illustrated with schematic diagrams, graphs and photographs. *Subject Headings:* **1. Acoustics 2. Wave propagation 3. Textbooks.**—*M.R.*

3.2–204 551.596.5(691)

Poisson, R. P., **Sur l'audibilité du tonnerre à Tananarive.** [Audibility of the thunder at Tananarive.] *La Météorologie*, 4th Ser., No. 21:19–25, Jan.–March **1951.** 2 figs. French, English and Spanish summaries p. 19. **MH-BH**—The methods of measuring the audibility of thunder and their reliability are discussed. Instances in which thunder was heard at distances of 39 to 57 km. from the point where lightning occurred are cited. *Subject Headings:* **1. Thunder 2. Madagascar.**—*I.L.D.*

PART II. A SELECTIVE ANNOTATED BIBLIOGRAPHY ON CARBON DIOXIDE IN THE ATMOSPHERE

By: *Nina A. Stepanova*

EXPLANATORY NOTE

This bibliography contains references to articles on the content of carbon dioxide in the air, at the surface of the earth and aloft. Investigation of the origin, causes of variations, local influences, vertical and horizontal distribution over the globe, relation to other gases of the atmosphere and to various meteorological elements are included. The detailed problems concerned are arranged by subject heading in the following outline.

As most of the measurements of CO_2 in the atmosphere were made during the 19th century, a great number of the references contained herein are of historical rather than of immediate practical interest. Consequently, no attempt has been made to give more than brief annotations for these older articles. A number of additional items of historical interest will be found on pages 1–2 of the bibliography on Climatic Variations prepared for the International Geographical Union (Lwów, 1938) by HENRYK ARCTOWSKI. Finally, we wish to express appreciation to Dr. HELMUT E. LANDSBERG for the use of a list of about 100 references on CO_2 in the atmosphere which he prepared a number of years ago.

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BIBLIOGRAPHY ON CARBON DIOXIDE IN THE ATMOSPHERE

1764

3B–1 551.510.41

Macbride, David, **Experimental essays**. . . . London, **1764.**—Unchecked. The first recognition of carbon dioxide as a regular constituent of the atmosphere. The author estimated the amount of carbon dioxide gravimetrically after drawing a measured volume of air over "caustic alkali," a process which, with some modification, remained as the standard for a long time. *Subject Heading:* **1. Carbon dioxide measurement.**

1805

3B–2 551.510.41(42)

Dalton, John, **Experimental enquiry into the proportion of the several gases or elastic fluids, constituting the atmosphere.** *Manchester Literary and Philosophical Society, Memoirs*, 2nd Ser., 1:244–258, **1805.** 2 tables. **DLC**—Early determinations of the weight of the carbon dioxide atmosphere. The proportional weights of different gases in a given volume of atmospheric air, taken at the surface of the earth, are shown in a table. The proportional weight of carbon dioxide was determined as 0.10 percent. *Subject Headings:* **1. Carbon dioxide 2. Manchester, England.**

1830

3B–3 551.510.41(494)

*de Saussure, Théodor, **Mémoire sur les variations de l'acide carbonique atmosphérique.** [Memoir on the variations of carbon dioxide in the atmosphere.] *Annales de Chimie et de Physique*, Paris, 44:5–45, **1830.** tables, 11 refs. **DLC**—The quantity of carbon dioxide in the air of Geneva and Chambesy was investigated under different wind conditions, at different hours and in different months. The mean value of carbon dioxide obtained in lower places was 4.15 in 10,000 volume parts. A greater amount has been noticed in the atmosphere over the mountains in the vicinity of Geneva. The causes of diurnal variations, the influences of wind and large bodies of water are explained. *Subject Headings:* **1. Carbon dioxide variations 2. Mountain air 3. Geneva, Switzerland.**

1844

3B–4 551.510.41(44)

*Boussingault, Jean Baptiste J. D., **Recherches sur la quantité d'acide carbonique contenue dans l'air de la ville de Paris.** [Investigations of the quantity of carbon dioxide in the air of Paris.] *Annales de Chimie et de Physique*, Paris, 3rd Ser., 10:456–469, **1844.** 2 tables, 8 refs. **DLC**—Measured the quantity of carbon dioxide in the air and obtained 3.9 vol. parts during the day and 4.2 vol. parts at night in 10,000 parts of air. Tables of observations are presented. The results are compared with data obtained by other investigators. *Subject Headings:* **1. Carbon dioxide 2. Urban air 3. Paris, France.**

3B–5 551.510.41(44)

Boussingault, Jean Baptiste J. D. and Lévy, Bernhard Karl, **Observations simultanées faites à Paris et à Audilly, près Montmorency, pour rechercher la proportion d'acide carbonique contenue dans l'air atmosphérique.** [Simultaneous observations in Paris and Audilly near Montmorency for the investigation of the amount of carbon dioxide in the atmosphere.] *Annales de Chimie et de Physique*, Paris, 3rd Ser., 10:470–474, **1844.** 3 tables. **DLC**—Results of observations are given in tables. The content of carbon dioxide is slightly increased in urban air. *Subject Headings:* **1. Carbon dioxide 2. Urban air 3. Paris, France.**

1846

3B–6 551.510.41:551.464

Lévy, Bernhard Karl, **Recherches sur la composition des gaz.** [Investigations on the composition of gases.] *Annales de Chimie et de Physique*, Paris, 3rd Ser., 17:5–23, **1846.** 4 tables, 7 refs. **DLC**—The author shows that the changes in the relative amounts of several gases contained in solution in sea water depend upon: 1) the variations in intensity of direct and diffused solar light, producing a correspondent effect upon the vitality of sea plants and animals, and 2) the alterations of temperature. Consequently, the variations of carbon dioxide would be most perceptible in the air above tropical oceans. *Subject Headings:* **1. Carbon dioxide variations 2. Oceanographic chemistry.**

1850

3B–7 551.510.41(86)

Lévy, Bernhard Karl, **Sur la composition chimique de l'air.** [On the chemical composition of the air.] *Académie des Sciences, Paris, Comptes Rendus*, 31:725–726, **1851. DLC**—During 1850, series of air analyses were made in Bogotá. Results of measurements are discussed and compared with other data. In August and September the maximum quantity reached 47 parts in 10,000 but in March–July it was never higher than 3–4 parts in 10,000 of air. *Subject Headings:* **1. Carbon dioxide 2. Urban air 3. Bogotá, Colombia.**

1851

3B–8 551.510.41

Mène, Charles, **Note sur la quantité d'acide carbonique dans l'air à differentes hauteurs. Première série d'expériences faites au Panthéon, les 8, 10 et 11 juillet 1851.** [On the quantity of carbon dioxide in the air at different heights. First series of experiments made at the Panthéon on July 8, 10 and 11, 1851.] *Académie des Sciences, Paris, Comptes Rendus*, 33:39, **1851. DLC**—Measurements of carbon dioxide content in large masses of air (125, 115 and 160 liters) were made at different heights of the Panthéon. *Subject Headings:* **1. Carbon dioxide measurement 2. Paris, France.**

3B–9 551.508.95:551.510.41

Mène, Charles, **Nouvelle manière de doser l'acide carbonique; mesures et quantités de ce gaz dans l'atmosphère; remarque sur les analyses organiques.** [On a new method of determining carbon dioxide and on the amount of it in the atmosphere; remarks on organic analyses.] *Académie des Sciences, Paris, Comptes Rendus*, 33:222–224, **1851.** table. **DLC**—Author outlines his new method. An apparatus, the main part of which consists of a large aspirator which draws the air through a corked bottle containing an accurately measured quantity of solution of caustic potash, is described. Measurements made by this method are shown in figures. *Subject Heading:* **1. Carbon dioxide apparatus.**

1852

3B–10 551.510.41(261)

Lévy, Bernhard Karl, **Recherches sur la constitution de l'atmosphère.** [Investigations of atmospheric composition.] *Annales de Chimie et de Physique*, Paris, 3rd Ser., 34:5–29, **1852.** 9 tables, ref. **DLC**—A series of measurements of the amount of carbon dioxide contained in the air

over the ocean were made during a voyage from Havre to Santa Marta. The mean content of carbon dioxide was 4.630 in 10 thousand. Remarkable difference has been found between night and day determinations. *Subject Headings:* **1. Carbon dioxide 2. Sea air 3. Atlantic Ocean.**

3B–11 551.510.41

Regnault, Henri Victor, **Recherches sur la composition de l'air atmosphérique.** [Investigations of the composition of atmospheric air.] *Annales de Chimie et de Physique*, Paris, 3rd Ser., 36:385–405, **1852.** 3 figs., 11 tables. **DLC**—The author noticed that an accurate determination of the amount of atmospheric carbon dioxide cannot be made in air contained for any length of time in a glass tube, because the glass absorbs a portion of the gas. *Subject Heading:* **1. Carbon dioxide measurement.**

3B–12 551.510.41

Schlagintweit, Adolph, **Ueber die Menge der Kohlensäure in den höheren Schichten der Atmosphäre.** [The amount of carbon dioxide in the higher layers of the atmosphere.] *Annalen der Physik und Chemie*, 87:293–306, **1852.** 3 tables, 4 refs. **DLC**—Methods of analysis are described and results given in tables. Amounts of carbon dioxide at different heights (up to 4224 m.) and in various places are compared and the existence of smaller quantities observed at lower levels is explained by the absorption of this gas by the ground and its dissociation by vegetation. *Subject Headings:* **1. Carbon dioxide measurement 2. Upper atmosphere.**

1856

3B–13 551.508.95:551.510.41

Hlasiwetz, Heinrich Hermann, **Ueber Kohlensäurebestimmungen der atmosphärischen Luft.** [Determinations of carbon dioxide in the atmospheric air.] *Chemisches Central-Blatt, Neue Folge*, Leipzig, 1 Jahrgang, 2(33):515–526, **1856.** fig., 2 tables, equations. **NN**—Survey and analysis of several methods of carbon dioxide measurement and suggestion of a new one, which is usable for hygrometric purposes. *Subject Heading:* **1. Carbon dioxide measurement.**

1857

3B–14 551.508.95:551.510.41

Hlasiwetz, Heinrich Hermann and von Gilm, Hugo, **Apparat zur Bestimmung der Kohlensäure in der Luft.** [Apparatus for determining the carbon dioxide in the air.] *Chemisches Central-Blatt, Neue Folge*, Leipzig, 2 Jahrgang, 2(48):759–760, **1857.** 2 figs. **DLC**—Description of an apparatus with an aspirator and baryta water as the absorbing substance. *Subject Heading:* **1. Carbon dioxide apparatus.**

3B–15 551.510.41(436)

von Gilm, Hugo, **Bestimmungen des Kohlensäuregehaltes in der Luft zu Innsbruck.** [Determinations of carbon dioxide content in the air in Innsbruck.] *Vienna, (K.) Akademie der Wissenschaften, Math.-Naturwiss. Klasse, Sitzungsberichte*, 24:279–284, **1857.** 3 figs., 2 tables, 3 refs. Abstracted from reprint. **DWB**—Nineteen measurements of carbon dioxide were made in Innsbruck. In different meteorological conditions the volume of carbon dioxide varied from 3.82 to 4.58. The mean value has been found to be 4.15 volume parts in 10,000. *Subject Headings:* **1. Carbon dioxide measurement 2. Urban air 3. Innsbruck, Austria.**

1858

3B–16 551.508.95:551.510.41

Pettenkofer, Max, **Volumetric estimation of atmospheric carbonic acid.** *Chemical Society of London, Quarterly Journal*, 10:292–297, **1858.** fig. **DLC**—Schematic presentation of the apparatus and detailed description of Pettenkofer's method as the most popular one used in experimental work for the investigation of carbon dioxide content in the atmosphere. *Subject Heading:* **1. Carbon dioxide apparatus.**

1859

3B–17 551.510.41(42)

Smith, R. Angus, **On the air of towns.** *Chemical Society of London, Quarterly Journal*, 11:196–235, **1859.** tables, 2 refs. **DLC**—Extensive discussion of the properties of the air in towns, considering the combustion of carbon, sulphur acids, ozone, oxygen, ammonia and carbon in the air. Method of estimating carbon dioxide is described and results of measurements are given. The increase of carbon dioxide in the center of Manchester is estimated as 4.9 per 10,000 in comparison with the hills near Preston. High winds and stormy weather result in a marked decrease in carbon dioxide. *Subject Headings:* **1. Carbon dioxide 2. Urban air 3. Manchester, England.**

1861

3B–18 551.510.41(44)

Frankland, Edward, **On the composition of air from Mont Blanc.** *Chemical Society of London, Quarterly Journal*, 13:22–30, **1861.** tables. **DLC**—Estimations of oxygen and carbon dioxide made by several investigators in different places are quoted and results of air analysis from Mont Blanc are presented. The percentage of carbon dioxide is found to be generally, but not invariably, greater in the higher regions of the atmosphere. *Subject Headings:* **1. Carbon dioxide 2. Mountain air 3. Mont Blanc, France.**

1862

3B–19 551.508.95:551.510.41

Eliot, Charles W. and Storer, Frank H., **On the extreme difficulty of removing the last traces of carbonic acid from large quantities of air.** *American Academy of Arts and Sciences, Proceedings*, 5:62–66, **1862.** 10 refs. **DLC**—Some consideration of the problem is followed by the statement that the carbon dioxide which escapes absorption in ordinary experiments cannot be of sufficient amount to be mentioned as a source of inaccuracy in the determination of the carbon dioxide of the air. *Subject Heading:* **1. Carbon dioxide measurement.**

1863

3B–20 551.510.41

Mène, Charles, **Dosage de l'acide carbonique de l'air.** [On the estimation of carbonic acid in the atmosphere.] *Académie des Sciences, Paris, Comptes Rendus*, 57:155–156, **1863. DLC**—The conclusions from a series of experiments estimating the variations of the amount of carbon dioxide in the air are cited and causes of variations discussed. *Subject Heading:* **1. Carbon dioxide variations.**

1864

3B–21 551.510.41(42)

Roscoe, Henry E., **Note on the amount of carbonic acid contained in the air of Manchester.** *Chemical News*, London, 9:80, **1864. NN**—Measurements made by PETTENKOFER's method were checked in several instances by simultaneous weight determinations. Measurements of carbon dioxide content were made in Manchester, Stretford, London, in open air and in the air of some closed, inhabited spaces. Results are given in figures. The author concludes that the combustion of coal and the respiration of animals exert no appreciable influence on the quantity of carbon dioxide in the air of Manchester, judging from samples collected in an open area. *Subject Headings:* **1. Carbon dioxide 2. Urban air 3. Manchester, England 4. Stretford, England 5. London, England.**

1867

3B–22 551.510.41(261/4)

*Thorpe, Thomas Edward, **On the amount of carbonic acid contained in sea-air.** *Chemical Society of London, Quarterly Journal*, 20:189–199, **1867.** 4 tables, 11 refs. **DLC**—Discussing the experiments and conclusions made by earlier investigators, the author presents the results of his investigations of different problems pertaining to carbon dioxide content in the air. In conclusion, he asserts that the sea does not act in increasing the amount of atmospheric carbon dioxide. *Subject Headings:* **1. Carbon dioxide 2. Sea air 3. Atlantic Ocean.**

3B–23 551.510.41(81)

Thorpe, Thomas Edward, **On the amount of carbonic acid contained in the atmosphere of tropical Brazil during the rainy season.** *Chemical Society of London, Quarterly Journal*, 20:199–201, **1867.** table, ref. **DLC**—Determination of the amount of carbon dioxide contained in the land air of the tropics was made at Pará by PETTENKOFER's method. Results presented in table. The mean quantity for April and May was 3.28 in 10,000 volume parts of air. *Subject Headings:* **1. Carbon dioxide 2. Pará, Brazil.**

1868

3B–24 551.510.41

Smith, R. Angus, **On the composition of the atmosphere.** *Manchester, Literary and Philosophical Society, Memoirs*, 3rd Ser., 3:1–56, **1868.** tables, refs. **DLC**—Ample data on air analyses are presented in tables and discussed. Carbon dioxide content is shown for various places on the globe, in open land, in forests, in hospitals, etc. The variations, caused by different factors, are discussed and the article concludes with the assertion that it is important to observe minute fractions in the amount of carbon dioxide in the atmosphere. *Subject Headings:* **1. Carbon dioxide distribution 2. Forest air 3. Buildings 4. Indoor air.**

1869

3B–25 551.508.95:551.510.41

Gottlieb, Johann, **Notiz über "von Pettenkofer's" Methode der Kohlensäurebestimmung.** [Remark on Pettenkofer's method for determining carbon dioxide.] *Vienna, (K.) Akademie der Wissenschaften, Math-Naturwiss. Klasse, Sitzungsberichte*, Abt. 2, 60:263, **1869. DLC**—The author states that the accuracy of Pettenkofer's method (*see* 3B–16 above) depends mainly on the care taken in the preparation of the turmeric paper used in this process. He has found that when proper precautions are taken, the pigment of litmus answers the purpose as well. *Subject Heading:* **1. Carbon dioxide apparatus.**

1870

3B–26 551.510.41

Breiting, ——, **Quantity of carbonic acid contained in the air of school-rooms.** *Chemical News*, London, 22:83, **1870. NN**—The author made a series of carbon dioxide measurements in a room of 251.61 cubic meters containing 64 children. The results varied from 2.21 to 9.36 percent. *Subject Headings:* **1. Carbon dioxide 2. Buildings 3. Indoor air.**

1871

3B–27 551.510.41

Dorner, H., **Ueber den Kohlensäuregehalt der Luft in verschiedenen, von Menschen stark besetzten Räumen Hamburgs.** [On the content of carbon dioxide in the air of different, densely inhabited rooms in Hamburg.] *Chemisches Central-Blatt, 3. Folge*, 2:254–256, **1871. NN**—The measurements were made by PETTENKOFER's method. Numerous authentic data, mostly for school rooms, are given in figures. *Subject Headings:* **1. Carbon dioxide 2. Buildings 3. Indoor air.**

3B–28 551.510.41(431/5)

Kohlensäuregehalt der Luft. [The content of carbon dioxide in the air.] *Naturforscher*, Berlin, 4:359–360, **1871. DLC**—Measurements of carbon dioxide made by SCHULZE in Rostock from Oct. 1868 to July 1871, gave the average value of 2.919 in 10,000 volumes of air. No annual or daily variations were found. Snow fall was associated with a sudden rise of carbon dioxide quantity, but rain exercised the opposite influence. Wind direction has a noticeable effect. *Subject Headings:* **1. Carbon dioxide 2. Urban air 3. Rostock, Germany.**

1872

3B–29 551.510.41

Smith, R. Angus, **On the composition of the atmospheric air and rain-water.** *Chemical Society of London, Quarterly Journal*, 25:33–34, **1872.** 3 tables. **DLC**—The amount of carbon dioxide and oxygen in air was determined under a variety of circumstances and in different places. The results are given in tables. Rainwater was chemically analyzed. *Subject Headings:* **1. Carbon dioxide 2. Atmospheric composition 3. Rainwater analysis.**

3B–30 551.510.41(42)

Weaver, Richard, **On the quality of atmospheric air in public and private buildings in Leicester.** *Lancet*, London, 2:7, 150, 223, **1872.** table. **DLC**—A very interesting survey of the content of carbon dioxide in various rooms. Results given in figures for 15 places vary from 0.81 in prisoner's cell to 3.09 in national school (per 1000 of air). In the hall of Crown Court it was 1.96 but in the gallery, 2.90. The higher percentage of carbon dioxide in the galleries testifies to the fact of its ascension with aerial currents and that there is no tendency towards accumulation in the lower strata of air from superior specific gravity as has been sometimes argued. *Subject Headings:* **1. Carbon dioxide 2. Buildings 3. Urban influences 4. Leicester, England.**

1873

3B–31 551.510.41(431/5)

Fleck, Hugo, **Kohlensäuregehalt der Grundluft.** [Carbon dioxide content of the air in the soil.] *Chemisches Central-Blatt, 3. Folge*, 4:715–716, **1873.** 4 tables. **NN**—Experiments made in the Botanical Garden in Dresden. The measurements of carbon dioxide were carried out at different depths in the soil—2.4 and 6 m. Results are shown in tables. Conclusion is reached that carbon dioxide comes from the oxidation process in the soil. *Subject Headings:* **1. Carbon dioxide 2. Soil air 3. Dresden, Germany.**

3B–32 551.510.41

Grandeau, Louis, **Sur la quantité d'acide carbonique existant dans l'air atmosphérique, par le professeur Henneberg.** [On the quantity of carbon dioxide in the atmospheric air.] *Journal*

d'Agriculture Pratique, Paris, 2:10, **1873.** table. **DA**—Brief review of the experiments made by F. SCHULZE and PROF. HENNEBERG to determine the quantity of carbon dioxide in the atmosphere and its variations. *Subject Headings:* **1. Carbon dioxide 2. Carbon dioxide variations.**

3B–33 551.510.41(431/5)

Henneberg, Johann Wilhelm J., **Der Kohlensäuregehalt der atmosphärischen Luft.** [The content of carbon dioxide in the atmospheric air.] *Landwirthschaftliche Versuchs-Stationen, Organ*, Chemnitz, 16:70–71, **1873.** 2 tables, 2 refs. **DLC**—Author's experiments, made during the summer of 1872 at Weende, confirmed SCHULZE's results obtained at Rostock. Seventeen measurements gave a mean value of 3.2 volumes of carbon dioxide per 10,000 of air at 0°C. and pressure of 760 mm. *Subject Headings:* **1. Carbon dioxide 2. Weende, Germany**

3B–34 551.510.41(44)

Truchot, P., **Sur la proportion d'acide carbonique existant dans l'air atmosphérique. Variation de cette proportion avec l'altitude.** [On the amount of carbon dioxide in the atmospheric air. Variation of this amount with altitude.] *Académie des Sciences, Paris, Comptes Rendus*, 77:675–678, **1873.** 2 refs. **DLC**—Describes the method of measurement and presents the results in figures. Under different conditions and at different hours the quantity of carbon dioxide ranges from 3.14 to 6.49 volume parts in 10,000 parts of air. Measurements have been made at altitudes up to 1884 m. on Pic de Sancy. *Subject Headings:* **1. Carbon dioxide variations 2. Pic de Sancy, France.**

1874

3B–35 551.510.41

Cameron, Charles A., **Amount of carbonic acid in the air of canal boats.** *Chemical News*, London, 30:169–170, Oct. **1874. NN**—The amount of carbon dioxide was measured in several cabins of the boat. The results ranged from 0.098 to 0.95 per cent. *Subject Headings:* **1. Carbon dioxide 2. Boats 3. Indoor air.**

3B–36 551.510.41

Barker, George F., **On the amount of carbonic gas in the atmosphere.** *American Journal of Science*, 3rd Ser., 7(38):139, Feb. **1874. DWB**—A series of determinations made by TRUCHOT of the amount of carbon dioxide in the atmosphere. The method of analysis consisted in "passing a known volume of air through a graduated solution of barium hydrate, allowing the barium carbonate to deposit and retitrating the solution." The findings were: carbon dioxide content is a little greater during the night, the proportion is not appreciably greater in the city than in the open country, the quantity of carbon dioxide varies noticeably in the vicinity of green-leaved plants, according to the change of light conditions (the general mean is 4.09 parts in 10,000) and the proportion of carbon dioxide diminishes with altitude. *Subject Headings:* **1. Carbon dioxide measurement 2. Carbon dioxide variations.**

3B–37 551.508.95:551.510.41

Tommasi, Donato, **An apparatus for determining the moisture and carbonic anhydride in the air.** *Chemical News*, London, 29:284, **1874. NN**—The apparatus consists of a flask with a movable cover into which two stopcocks, a thermometer and an oil manometer are inserted. A metallic cylinder containing potassium hydrate is introduced inside and the stopcocks opened. A current of air is passed through the apparatus, the stopcocks are closed, and in a few minutes the manometer is read by means of a telescope, the amount of carbon dioxide is indicated by the elevation of the column of oil. *Subject Heading:* **1. Carbon dioxide apparatus.**

3B–38 551.510.41(431/5)

Pettenkofer, Max, **Über den Kohlensäuregehalt der Luft der Lybischen Wüste und unter der Oberfläche.** [Content of carbon dioxide in the air of the Libian Desert and under the surface.] *Munich, (K.) Akademie der Wissenschaften, Math.-Phys. Klasse, Sitzungsberichte*, 4:339–351, **1874. DLC**—Air analyses were made during an expedition to the Libyan Desert. The content of carbon dioxide was determined in the Farafreh Oasis—0.045, in the Dachel Oasis—0.049 volume percent. The author came to the conclusion that there is no difference between the content of carbon dioxide in the desert and in Germany. *Subject Headings:* **1. Carbon dioxide 2. Desert air 3. Germany 4. Africa.**

1875

3B–39 551.510.41

Tissandier, Gaston, **Dosage de l'acide carbonique de l'air à bord du ballon le Zénith.** [The amount of carbon dioxide in the air aboard the balloon "Zenith."] *Académie des Sciences, Paris, Comptes Rendus*, 80:976–978, **1875. DLC**—Methods of measurement are described. The main

part of the apparatus is a reversible aspirator, having a capacity of 22 liters, the air is drawn through tubes containing pumice stone, saturated with potash solution. The air taken at the heights of 800–1000 m. in a balloon contained 2.4–3.0 volume parts of carbon dioxide in 10,000 parts of air. *Subject Heading:* **1. Carbon dioxide apparatus.**

1876

3B–40 551.508.95:551.510.41(485)

Classon, Peter, **Barythydrat, in geeigneter Weise prepariert, zu allen Zwecken der Kohlensäure-absorption anwendbar.** [Barium hydrate, specially prepared, applicable for absorption of carbon dioxide for any purpose.] *Deutsche Chemische Gesellschaft, Berichte*, Berlin, 9:174–176, **1876.** 2 refs. **DLC**—The use of baryta hydrate as a substance absorbing carbon dioxide, in experiments for quantitative estimations of the latter, is discussed. Special method described. Thirty-one estimations made in Lund gave the mean value of 2.79 volume parts. *Subject Headings:* **1. Carbon dioxide apparatus 2. Urban air 3. Lund, Sweden.**

3B–41 551.510.41(411)

Pattison, Muir, **On the amount of carbon dioxide in the air of sea coast.** *Chemical News*, London, 33:16, **1876. DLC**—Air samples taken at Ardrossan on the Firth of Clyde, where the river nearly merges with the open sea, showed that the amount of carbon dioxide is uninfluenced by the presence of the sea. *Subject Headings:* **1. Carbon dioxide 2. Ardrossan, Scotland.**

3B–42 551.510.41(431/5)

Farsky, Franz, **Bestimmungen der atmosphärischen Kohlensäure in den Jahren 1874–1875 zu Tabor (Böhmen).** [Estimation of atmospheric carbon dioxide in Tabor, Bohemia in 1874 and 1875.] *Chemisches Central-Blatt, 3. Folge*, 8:198, **1877.** table. **DLC**—Maximum, minimum and mean monthly values of the content of carbon dioxide in the air are given at 0°C. and 760 mm. of pressure. The amount of carbon dioxide appeared to depend on the weather. Northwest and southwest winds lowered the proportions, north winds exercised the opposite influence. *Subject Headings:* **1. Carbon dioxide variations 2. Urban air 3. Tabor, Czechoslovakia.**

3B–43 551.510.41

Schulze, Ernst August, **Kohlensäurebestimmung in der atmosphärischen Luft, vom Standpunkte der Hygiene.** [Determinations of carbon dioxide in the atmospheric air, from the standpoint of hygiene.] *Chemisches Central-Blatt, 3. Folge*, 8:8, **1877. NN**—Using PETTENKOFER's method, a series of measurements has been made in inhabited rooms in different places. *Subject Headings:* **1. Carbon dioxide 2. Buildings 3. Indoor air 4. Urban influences.**

3B–44 551.510.41(44)

Truchot, P., **Sur la proportion d'acide carbonique contenu dans l'air atmosphérique pendant l'hiver.** [Amount of carbon dioxide in the atmospheric air in winter.] *Annales Agronomiques*, Paris, 3:69–73, **1877.** table, ref. **DLC**—Forty-nine measurements of carbon dioxide content in the air were made from April 7 to 14, 1876. The mean value for clear days was 0.033 volume percent. The rainy days gave 0.046. Measurements made during the days with snow cover showed the biggest mean value—0.056. It was found that each kilogram of snow brought 25.5 cubic centimeters of carbon dioxide to the ground. *Subject Headings:* **1. Carbon dioxide 2. Precipitation composition 3. Clermont-Ferrand, France.**

1878

3B–45 551.510.41

Ebermayer, Ad. and Swappach, ——, **Mitteilungen über den Kohlensäuregehalt der Waldluft und des Waldbodens im Vergleich zu der einer nicht bewaldeten Fläche.** [Reports on the carbon dioxide content in the forest air and in the forest ground compared with open land.] *Biedermann's Centralblatt für Agrikulturchemie und rationellen Landwirtschafts-Betrieb*, 7:644–648, **1878.** 5 refs. **DLC**—The air within a vast forest contains in summer almost double the amount of the carbon dioxide found over the open country. An inverse ratio is noticed in the soil air. *Subject Headings:* **1. Carbon dioxide 2. Forest air 3. Soil air.**

3B–46 551.510.41:550.4

Meunier, Étienne Stanislas, **Sur l'atmosphère des corps planétaires et sur l'atmosphère terrestre en particulier; remarques à l'occasion d'un travail recent de M. Sterry Hunt.** [On the atmosphere of planetary bodies and especially on the terrestrial one; remarks on the recent work of Mr. Sterry Hunt.] *Académie des Sciences, Paris, Comptes Rendus*, 87:541–544, **1878.** 4 refs. **DLC**—Large beds of carboniferous cast iron are believed to be present in the interior of the earth. Coming in contact with water at high temperatures they yield hydrocarbons. These, on their subsequent combustion, give rise to the carbon dioxide exhaled from the earth. *Subject Headings:* **1. Carbon dioxide 2. Geochemistry.**

3B–47 551.510.41(268)

Moss, Edward, **Notes on Arctic air.** *Royal Dublin Society, Scientific Proceedings, New Ser.*, 2:34–41, 1878. 8 refs. **DLC**—Considerably more carbon dioxide has been found in Arctic air than in that of lower latitudes. Three measurements made by PETTENKOFER's method gave 0.642, 0.482 and 0.536 percent. *Subject Headings:* **1. Carbon dioxide 2. Arctic air.**

3B–48 551.510.41:550.4

Sterry-Hunt, T., **Sur les relations géologiques de l'atmosphère.** [The geological relations of the atmosphere.] *Académie des Sciences, Paris, Comptes Rendus*, 87:452–454, **1878. DLC**—The author holds to the opinion that carbon dioxide escaping from volcanoes and mineral springs to the atmosphere is a product of decomposition of carbonates which were formerly produced on the surface of the earth from atmospheric carbon dioxide. *Subject Headings:* **1. Carbon dioxide 2. Geochemistry.**

1879

3B–49 551.508.95:551.510.41

Kapustin, M., **Eine Methode, den Kohlensäuregehalt der Luft zu bestimmen.** [Method of determining the content of carbon dioxide in the air.] *Deutsche Chemische Gesellschaft, Berichte*, Berlin, 12:2374–2377, **1879.** equation. **DLC**—Sodium hydrate is dissolved in alcohol, the solution is shaken and water is added for the complete solution of the carbonate. The number of cubic centimeters of carbonic acid is computed according to a given formula. *Subject Heading:* **1. Carbon dioxide measurement.**

3B–50 551.508.95:551.510.41

Kratschmer, Fl. and Wiener, E., **Grundzüge einer neuen Bestimmungsmethode der Kohlensäure in der Luft.** [Fundamentals of a new method of estimation of carbon dioxide in the air.] *Monatshefte für Chemie*, 15:429–432, **1879.** 2 formulas. **NN**—A description of the titration method is given in detail with chemical formulas illustrating the process. *Subject Heading:* **1. Carbon dioxide measurement.**

3B–51 551.510.41(73)

Lupton, N. T., **Sanitary conditions of air in public schools.** *Chemical News*, London, 39:180–181, **1879.** table. **DLC**—Measurements of carbon dioxide in the air in the public schools of Nashville were made each day from 12:30 to 1:30 p.m. The results are shown in a table. *Subject Headings:* **1. Carbon dioxide 2. Buildings 3. Nashville, Tennessee.**

3B–52 551.508.95:551.510.41

Reiset, Jules, **Recherches sur la proportion de l'acide carbonique dans l'air.** [Investigations of the content of carbon dioxide in the air.] *Académie des Sciences, Paris, Comptes Rendus*, 88:1007–1011, **1879. DLC**—Contains detailed description of a method for precise air analysis. *Subject Heading:* **1. Carbon dioxide measurement.**

3B–53 551.508.95:551.510.41

Smith, R. Angus, **Absorption von Gasen durch Holzkohle.** [Absorption of gases by charcoal.] *Deutsche Chemische Gesellschaft, Berichte*, Berlin, 12:388–389, **1879. DLC**—Report on the experiments made to determine the amount of different gases absorbed by charcoal. The amount of carbon dioxide absorbed was found to be 484 times the amount of hydrogen (by weight). *Subject Heading:* **1. Carbon dioxide measurement.**

1880

3B–54 551.510.41

†Armstrong, George Frederick, **On the diurnal variation in the amount of carbon dioxide in the air.** *Royal Society of London, Proceedings*, 30:343–355, **1880.** 2 tables, 12 refs. **DWB**—Differences in the content of carbon dioxide between day and night were investigated. Midnight measurements gave the mean value of 3.2999 volume parts in 10,000 volume parts of air. Midday average value was 2.9603 volume parts. The effect of plants is explained. *Subject Heading:* **1. Carbon dioxide variations.**

3B–55 551.510.41(45)

Macagno, H., **A series of analyses of air.** *Chemical News*, London, 41:97, **1880.** 2 tables. **DLC**—Examinations of air in Palermo, Italy, were made at its Astronomical Observatory, 72 m. above sea level. Carbon dioxide was measured by determining the increase of weight of a caustic potash solution after the passage of a known volume of air. Results are given in tables. A lack of oxygen during sirocco was noticed. *Subject Headings:* **1. Carbon dioxide measurement 2. Palermo, Italy.**

3B–56 551.510.41

Marié-Davy, Edme Hippolyte, **Proportion d'acide carbonique dans l'air.** [The amount of carbon dioxide in the air.] *Académie des Sciences, Paris, Comptes Rendus*, 90:1287–1289, **1880. DLC**—A reply to the second communication of Reiset (*see* **3B–59** below). The author holds to the opinion that many well established facts contradict the theory of the uniform distribution of carbon dioxide through the atmosphere. *Subject Heading:* **1. Carbon dioxide distribution.**

3B–57 551.510.41(44)

Marié-Davy, Edme Hippolyte, **L'acide carbonique de l'air, dans ses rapports avec les grands mouvements de l'atmosphère.** [Relation of carbon dioxide in the air to large-scale atmospheric movements.] *Académie des Sciences, Paris, Comptes Rendus*, 90:32–35, **1880.** 2 tables. **DLC**—Daily analyses of air composition were made at Montsouris Observatory for four years. Some relations between the content of carbon dioxide and meteorological factors were established. Prognostic importance of the relation of carbon dioxide with radiation is discussed. *Subject Headings:* **1. Carbon dioxide 2. Montsouris, France.**

3B–58 551.510.41(431.5)

Hässelbarth, P. and Fittbogen, J., **Beobachtungen über lokale Schwankungen im Kohlensäure Gehalt der atmosphärischen Luft.** [Observations of local variations of carbon dioxide content in the atmospheric air.] *Biedermann's Centralblatt für Agrikulturchemie und rationellen Landwirtschafts-Betrieb*, 9:161–164, March **1880.** 4 refs. **DLC**—The author compares the results obtained in Dahme and Rostock. The amount of carbon dioxide in the atmosphere in Rostock decreased with a SW wind and increased with NE currents. In Dahme, the proportion was greatest with westerly wind. A slight diminution was caused by rain and dew; sunshine and shade showed no influence. *Subject Headings:* **1. Carbon dioxide variations 2. Urban air 3. Dahme, Germany 4. Rostock, Germany.**

3B–59 551.510.41

Reiset, Jules, **Proportion de l'acide carbonique dans l'air; réponse à M. Marié-Davy.** [Content of carbon dioxide in the air; answer to Mr. Marié-Davy.] *Académie des Sciences, Paris, Comptes Rendus*, 90:1457–1459, **1880.** 2 refs. **DLC**—Discusses the stability of the content of carbon dioxide in the air and assumes that its distribution is not affected by altitude (*see* 3B–56 above). *Subject Heading:* **1. Carbon dioxide.**

3B–60 551.510.41(43)

Reiset, Jules, **Recherches sur la proportion de l'acide carbonique dans l'air.** [Investigations of the content of carbon dioxide in the air.] *Académie des Sciences, Paris, Comptes Rendus*, 90:1144–1148, **1880.** fig., 4 refs. **DLC**—Measurements of carbon dioxide content in the air, using SCHLOESING's apparatus, intended for measurements of atmospheric ammonia, have been made and the mean value determined as 29.78 volume parts per 100,000 parts of air. This is almost the same proportion which was found by the author 6 years previously. It was established that the proportion of carbon dioxide in the atmosphere is greater during the night and less during the day. *Subject Headings:* **1. Carbon dioxide variations 2. Dieppe, France 3. Paris, France.**

3B–61 551.510.41:551.464

Schloesing, Jean Jacques Théophile, **Sur la constance de la proportion d'acide carbonique dans l'air.** [The stability of the content of carbon dioxide in the air.] *Académie des Sciences, Paris, Comptes Rendus*, 90:1410–1430, **1880. DWB**—First statement of the importance of the ocean in maintaining constancy of the content of carbon dioxide in the air. The ocean is considered as a great reservoir of carbonic acid because of the tendency of dissociation of the present carbon dioxide. Two kinds of variation of carbon dioxide content have been established: 1) slow variation of the mean contant in the whole atmosphere and 2) local variations of short periods. *Subject Headings:* **1. Carbon dioxide variations 2. Oceanographic chemistry.**

3B–62 551.510.41:631.4

Wollny, Martin Ewald, **Untersuchungen über den Einfluss der Pflanzendecke und der Beschattung auf den Kohlensäuregehalt der Bodenluft.** [Investigations of the effect of vegetation and shade on the content of carbon dioxide in the air of the soil.] *Biedermann's Centralblatt für Agrikulturchemie und rationellen Landwirtschafts-Betrieb*, 9:402–406, **1880.** table, 3 refs. **DLC**—Experiments, carried out during the warmer season of the year, showed that during this time the air in the soil, shaded by green plants, contained much less carbon dioxide than that where the soil was covered by dead plants or was bare; the opposite is the case during colder seasons. *Subject Headings:* **1. Carbon dioxide 2. Soil air.**

1881

3B–63 551.510.41

Müntz, Charles Achille and Aubin, E., **Sur le dosage de l'acide carbonique dans l'air.** [The content of carbon dioxide in the air.] *Académie des Sciences, Paris, Comptes Rendus*, 92:247–250, **1881. DLC**—The authors devised a method for determining whether the proportion of carbon dioxide in the air varies considerably in a given region, whether the carbon dioxide is concentrated in lower layers of the atmosphere or whether it is uniformly distributed. *Subject Heading:* **1. Carbon dioxide measurement.**

3B–64 551.510.41(43)

Müntz, Charles Achille and Aubin, E., **Sur la proportion d'acide carbonique contenu dans l'air.** [Amount of carbon dioxide contained in the air.] *Académie des Sciences, Paris, Comptes Rendus*, 92:1229–1230, **1881.** ref. **DLC**—The proportion of carbon dioxide in the air, taken at 6 m. from the ground in Paris, varied between 2.88 and 4.22 in 10,000. During turbulent weather the amount was lower than during calm weather. The highest proportions were found during heavy snow falls or thick fogs. The mean amount found in the neighborhood of Paris differs very little from that found at Dieppe. The diffusion of carbon dioxide appears to be very rapid and therefore it should be uniformly diffused through the atmosphere. *Subject Headings:* **1. Carbon dioxide variations 2. Paris, France 3. Dieppe, France.**

3B–65 551.510.41(43)

Müntz, Charles Achille and Aubin, E., **Sur les proportions d'acide carbonique dans les hautes régions de l'atmosphère.** [The content of carbon dioxide in upper regions of the atmosphere.] *Académie des Sciences, Paris, Comptes Rendus*, 93:797–799, **1881.** table. **DWB**—Investigations of the content of carbon dioxide were carried out at Pic du Midi (2877 m.) in the Pyrenees. Results were compared with figures obtained at lower altitudes (730 and 507 m.) and in lowland. All data appeared to be very close to the average value of 2.86 volume parts in 10,000 volume parts of air. This led to the conclusion that an even distribution of carbon dioxide exists in the whole atmosphere. *Subject Headings:* **1. Carbon dioxide distribution 2. Pic du Midi, France.**

1882

3B–66 551.510.41

Barker, George F., **On the carbon dioxide of the atmosphere.** *American Journal of Science*, 3rd Ser., 24:387–389, **1882. DWB**—Considering the amount of carbon dioxide in the atmosphere given by DE SAUSSURE, BOUSSINGAULT and others as being too high, the author gives a comparative review of results obtained by REISET, DUMAS, SCHULZE, MÜNTZ and AUBIN, which showed the mean value as 2.8–2.9 volume parts in 10,000 parts of air. *Subject Heading:* **1. Carbon dioxide.**

3B–67 551.510.41

Dumas, Jean, **Sur l'acide carbonique normal de l'air atmosphérique.** [Normal content of carbon dioxide in the atmosphere.] *Académie des Sciences, Paris, Comptes Rendus*, 94:589–594, **1882. DLC**—Further observations of carbon dioxide in different parts of the world are suggested in order to determine amounts and causes of variations. The action of plants and animals is considered less important than that of volcanic fissures and craters and the fixation of carbon dioxide in the seas. *Subject Heading:* **1. Carbon dioxide variations.**

3B–68 551.508.95:551.510.41

Mascart, Eleuthère Élie Nicolas, **Sur la mesure de l'acide carbonique contenu dans l'atmosphère.** [Measurement of the content of carbon dioxide in the atmosphere.] *Académie des Sciences, Paris, Comptes Rendus*, 94:1389–1390, **1882. DLC**—The advantage of this method is the small quantity of air required, only about 400 cc., and it is recommended especially for the analysis of air during voyages, since small volumes of the air may be sealed in glass flasks and brought to the laboratory for analysis. *Subject Heading:* **1. Carbon dioxide measurement.**

3B–69 551.510.41(494)

Risler, ——, **Quantité d'acide carbonique contenue dans l'air à Calèves, près Nyon (Suisse) (altitude, 420 m.).** [The amount of carbon dioxide in the atmosphere at Calèves, near Nyon, Switzerland (altitude 420 m.).] *Académie des Sciences, Paris, Comptes Rendus*, 94:1390–1391, **1882.** table. **DLC**—Monthly mean values of the content of carbon dioxide are given in volume parts per 10,000. The annual value is 3.035. No text. *Subject Headings:* **1. Carbon dioxide 2. Nyon, Switzerland.**

1883

3B–70 551.510.41

Carbonic acid in the air. *Scientific American*, 49(14):208–209, **1883.** **DLC**—Concise review of experiments and data obtained by several investigators on the composition of the atmosphere. Results of early measurements of atmospheric carbon dioxide made by ANGUS SMITH, FARSKY, HENNEBERG, HÄSSELBARTH, FITTBOGEN, REISSLER, REISET, MÜNTZ and AUBIN in different places are given in figures. The sources supplying the carbon dioxide in the air and its importance for animal and vegetative life on earth are discussed. *Subject Heading:* **1. Carbon dioxide.**

3B–71 551.510.41(7)(8)

*Müntz, Charles Achille and Aubin, E., **Determination de l'acide carbonique de l'air dans les stations d'observation du passage de Vénus.** [Determination of carbon dioxide in the air at stations observing the passage of Venus.] *Académie des Sciences, Paris, Comptes Rendus*, 96:1793–1799, **1883.** fig., tables. **DWB**—Carbon dioxide measurements made at seven widely separated points of North and South America are shown in a table. No considerable differences were found between these places, but some local influences of meteorological factors were noticed. Night measurements gave everywhere higher values than those during the day. *Subject Headings:* **1. Carbon dioxide data 2. North America 3. South America.**

3B–72 551.508.95:551.510.41

Wolpert, A., **Taschenapparat zur Messung des Kohlensäregehaltes der Zimmerluft.** [Pocket apparatus for measurement of carbon dioxide content in the air of rooms.] *Chemisches Central-Blatt, 3. Folge*, 14:831, **1883.** **NN**—Describes a simple device which is a reliable air analyzer. Its use is recommended. *Subject Headings:* **1. Carbon dioxide apparatus 2. Indoor air.**

1884

3B–73 551.508.95:551.510.41

Balló, Mathias, **Ueber die Bestimmung des Kohlensäuregehaltes der Luft.** [Estimation of carbon dioxide content in the air.] *Deutsche Chemische Gesellschaft, Berichte*, Berlin, 17:1097–1100, **1884.** **DLC**—The method is based on the ability of carbon dioxide to discolor a solution of phenolphthalein. *Subject Heading:* **1. Carbon dioxide measurement.**

3B–74 551.508.95:551.510.41

Blochmann, Rudolf Sigismund, **Simple process for the approximate determination of carbonic acid in the air of inhabited rooms and in other gaseous mixtures.** *Chemical News*, London, 50:174, **1884.** **NN**—In this process, lime water of known strength is brought in contact with air saturated with carbon dioxide. The point of saturation is detected when a dilute solution of phenolphthalein, added to the water, results in a distinctly red color. *Subject Heading:* **1. Carbon dioxide measurement.**

3B–75 551.510.41:551.46

†Hamberg, Axel, **Hydrografisk-kemiska iaktagelser under den Svenska expeditionen till Grönland.** [Hydrographic and chemical observations on the Swedish expedition to Greenland.] (*K.*) *Svenska Vetenskapsakademiens, Handlingar*, Stockholm, 10(13):1–57, **1884.** 3 plates, photo, numerous refs. **DLC**—Elaboration of SCHLOESING's theory on the content of carbon dioxide in sea water as a quantity proportional to the partial pressure of carbon dioxide in the air. Experiments showed that sea water absorbs more carbon dioxide at lower temperatures. *Subject Headings:* **1. Carbon dioxide 2. Sea air 3. Greenland Sea.**

3B–76 551.510.41:551.521.3

Keeler, J. E., **On the absorption of radiant heat by carbon dioxide.** *American Journal of Science*, 128(165):190–198, **1884.** table, 4 refs. **DLC**—Describes the apparatus made for investigating heat absorption by carbon dioxide. Gives a record of observations made with the non-luminous flame of a Bunsen burner as a source of heat. Absorbing qualities of carbon dioxide are discussed. *Subject Headings:* **1. Carbon dioxide 2. Infrared absorption.**

3B–77 551.510.41(8)

Müntz, Charles Achille and Aubin, E., **Determination d'acide carbonique de l'air effectuée par la Mission du Cap Horn.** [Determination of carbon dioxide in the air by the Mission of Cape Horn.] *Académie des Sciences, Paris, Comptes Rendus*, 98:487–494, **1884.** tables. **DLC**—Contains the results of investigations made by DR. HYADES during the expedition to Cape Horn. Confirmation of SCHLOESING's theory of smaller proportion of this gas in the Southern Hemisphere is obtained. The mean value of all measurements in the Southern Hemisphere was 2.56 volume parts in 10,000.

The measurements made at night gave smaller amounts than those made during the day. This is explained by the absence of land and vegetation. *Subject Headings:* **1. Carbon dioxide variation 2. Cape Horn, Chile 3. Patagonia, South America.**

3B–78 551.510.41

Reichardt, Eduard, **Über den Kohlensäuregehalt der Luft.** [The content of carbon dioxide in the air.] *Chemisches Central-Blatt, 3. Folge,* 15:600–601, **1884.** **NN**—Survey of results obtained by various scientists in the measurement of the carbon dioxide content of the air and some remarks on the methods used. *Subject Heading:* **1. Carbon dioxide measurement.**

1885

3B–79 551.510.41(431/5):634

Ebermayer, Ernst Wilhelm, **Die Beschaffenheit der Waldluft und die Bedeutung der atmosphärischen Kohlensäure für die Waldvegetation, zugleigh eine übersichtliche Darstellung des gegenwärtigen Standes der Kohlensäurefrage.** [The composition of forest air and the importance of atmospheric carbon dioxide for forest vegetation, with a survey of the present state of the carbon dioxide problem.] Stuttgart, **1885.** 68 p. tables, refs. **DWB**—Extensive treatise on carbon dioxide in the air, especially in forest air. Methods of measurement of the content of carbon dioxide are described. Comparative investigation of carbon dioxide content in the air of Bavarian mountains and forests. The effect of weather conditions and the influence of cities on the content of carbon dioxide are discussed. *Subject Headings:* **1. Carbon dioxide 2. Forest air 3. Bavaria, Germany.**

3B–80 551.510.41(431/5)

Jeserich, ——, **Ueber Luftanalysen in hohen Regionen.** [On air analyses in high regions.] *Chemisches Central-Blatt, 3. Folge,* 16:805, **1885.** **NN**—Analysis was made in a balloon over Berlin and vicinity. The content of carbon dioxide varied from 6 to 10 per 10,000 at a height of 4–12 thousand ft. This abnormally high amount is explained by the absence of vegetation. *Subject Headings:* **1. Carbon dioxide variations 2. Upper atmosphere 3. Berlin, Germany.**

3B–81 551.510.41(42)

Kohlensäuregehalt der Londoner Luft. [The content of carbon dioxide in London's air.] *Österreichische Gesellschaft für Meteorologie, Zeitschrift,* Vienna, 20:153, **1885.** **DWB**—Two and a half years measurements of carbon dioxide, made in London, gave the mean value of 4 volume parts in 10,000 parts of air. The minimum quantity observed was 0.033 percent. The mean value of measurements made on foggy days was found to be 0.072 percent. *Subject Headings:* **1. Carbon dioxide 2. Urban air 3. London, England.**

1886

3B–82 551.508.95:551.510.41

Marcet, William, **Speedy volumetric determination of carbonic acid.** *Royal Society of London, Proceedings,* 41:181–195, **1886.** 2 plates. **DLC**—The method is based on the absorption of carbon dioxide by potassium hydrate in a closed receiver and the accurate measurement of the volume of dry atmospheric air required to re-establish the atmospheric pressure after complete absorption. *Subject Heading:* **1. Carbon dioxide measurement.**

3B–83 551.508.95:551.510.41

Nienstädten, E. and Balló, Mathias, **Apparat zur Bestimmung der Kohlensäure in der Luft.** [Apparatus for determination of carbon dioxide in the air.] *Chemisches Central-Blatt, 3. Folge,* 17:99–100, **1886.** fig. **NN**—The content of carbon dioxide in the air is determined by means of a solution of potassium or sodium which contains chlorobarium and phenophthalein as an indicator. A diagram of the apparatus is presented. *Subject Heading:* **1. Carbon dioxide apparatus.**

3B–84 551.508.95:551.510.41

Pettersson, Sven Otto, **Luftanalyse nach einem neuen Prinzip.** [Air analysis based on a new principle.] *Zeitschrift für analytische Chemie,* Wiesbaden, 25:467–478, **1886.** 4 figs., plate, table, 2 refs. **DLC**—Description of an apparatus and method for exact estimation of carbon dioxide content in the air, based on the principle of compensation. *Subject Heading:* **1. Carbon dioxide apparatus.**

3B–85 551.510.41(431/5)

Spring, Walter Victor and Roland, L., **Untersuchungen über den Kohlensäuregehalt der Luft.** [Investigation of the amount of carbon dioxide in the air.] *Chemisches Central-Blatt, 3. Folge,* 17(6):81–83, **1886.** **NN**—SCHULZE's and SCHLOESING's theory concerning the amount of carbon

dioxide in the air and its dependency on the bicarbonate of calcium, dissolved in sea water, are discussed. Experiments, extending over one year, were made at Liège. The mean of 266 analyses was 3.3526 volume parts per 10,000. The amount decreased with high wind and increased with high pressure. *Subject Headings:* **1. Carbon dioxide 2. Urban air 3. Liège, Belgium.**

3B–86 551.508.95:551.510.41

Strohmer, F., **Ein neuer Absorptionsapparat für Kohlensäurebestimmungen.** [New absorption apparatus for the determination of carbon dioxide.] *Zeitschrift für analytische Chemie*, Wiesbaden, 25:32–34, **1886.** fig., 2 tables. **DLC**—A modified GEISSLER's ball apparatus, which can absorb more than 2 gr. of carbon dioxide, is described and a diagram presented. *Subject Heading:* **1. Carbon dioxide apparatus.**

3B–87 551.508.95:551.510.41

Van Nüys, Thomas C., **New apparatus for the estimation of carbonic anhydride in the air.** *American Chemical Journal*, Baltimore, 8:190–196, **1886. DLC**—Description of an apparatus with baryta water used as the absorbent and rosolic acid used as the indicator during titration. *Subject Heading:* **1 Carbon dioxide apparatus.**

3B–88 551.510.41

Wollny, Martin Ewald, **Beiträge zur Frage der Schwankungen im Kohlensäuregehalt der atmosphärischen Luft.** [Contributions to the study of oscillations in carbon dioxide content of atmospheric air.] *Chemisches Central-Blatt, 3. Folge*, 17(16):289–290, **1886.** table, ref. **NN**—Considering numerous measurements of carbon dioxide made by various scientists in different places and presented in a consolidated table, the author concludes that its amount in the atmosphere is positively not constant and its variations have to be studied. Sources supplying carbon dioxide to the atmosphere are cited and the effect of vegetation and soil air, increasing the amount of carbon dioxide in the atmosphere, is emphasized. *Subject Heading:* **1. Carbon dioxide variations.**

1887

3B–89 551.510.41(474.2)

Dragendorff, Johann Georg Noël, **Über den Kohlensäuregehalt der Luft.** [On the content of carbon dioxide in the air.] *Chemisches Central-Blatt, 3. Folge*, 18:1367, **1887. NN**—Experiments made by FELD at Damberg near Dorpat gave 366 figures, which ranged from 1.9 to 3.6 parts per 10,000. The mean value was 2.66. *Subject Headings:* **1. Carbon dioxide 2. Damberg, Estonia.**

3B–90 551.508.95:551.510.41

Fossek, Wilhelm, **Kohlensäurebestimmung in der Luft der Schulzimmer.** [Measurements of carbon dioxide in the air of school rooms.] *Chemisches Central-Blatt, 3. Folge*, 18:1055, **1887. NN**—Description of an apparatus for taking air tests and determining the carbon dioxide content in the air in rooms with an accuracy of 1 percent. *Subject Headings:* **1. Carbon dioxide apparatus 2. Indoor air.**

3B–91 551.510.41

Marcet, William and Landriset, Auguste, **The influence of weather on the proportion of carbonic acid in the air of plains and mountains.** *Royal Meteorological Society, Quarterly Journal*, 13:166–173, **1887.** fig., table, ref. **DLC**—A series of experiments was undertaken on the top of the "Dole," the highest point of the Jura range and in the valley near Lake of Geneva, with a difference in altitude of 4193 ft. Determinations of carbon dioxide were made simultaneously by Pettenkofer's method at both points in order to determine the effects of altitude on its proportion. Results showed that in fine, clear weather the atmosphere holds the same mean proportion of carbon dioxide at both places. When the summit was covered by clouds, the air in the clouds contained a smaller portion of carbon dioxide. *Subject Headings:* **1. Carbon dioxide 2. Mountain air 3. Jura Range, Switzerland 4. Lake of Geneva, Switzerland.**

3B–92 551.508.95:551.510.14

Pettersson, Sven Otto and Palmqvist, A., **Ein tragbarer Apparat zur Bestimmung des Kohlensäuregehaltes der Luft.** [Portable apparatus for estimating carbon dioxide content in the atmosphere.] *Deutsche Chemische Gesellschaft, Berichte*, Berlin, 20:2129–2134, **1887.** fig., table, ref. **DLC**—A description of a modification of a portable apparatus devised for estimating aqueous vapor and carbon dioxide in the air at constant temperature and pressure. The calculation takes only a few minutes and the results agree well with those obtained by other methods. *Subject Heading:* **1. Carbon dioxide apparatus.**

3B–93 551.510.41(73/9)

Van Nüys, Thomas C. and Adams, Benjamin F., **Estimation of carbonic acid in the air.** *American Chemical Journal*, Baltimore, 9:64, 66, **1887.** 12 refs. **DLC**—Eighteen measurements of carbon dioxide in the air, taken ½ m. from the ground at University Park, Bloomington, on different days, gave the average value of 28.16 volume parts in 100,000. *Subject Headings:* **1. Carbon dioxide 2. Bloomington, Indiana.**

3B–94 551.510.41(436)

von Lorenz, N., **Kohlensäuregehalt der Luft auf dem Sonnblick (3100).** [Carbon dixiode content in the air of Sonnblick (3100).] *Meteorologische Zeitschrift*, 4:465–466, **1887. DWB**—Describes the method of determining the carbon dioxide content in the air. The measurements were made on the top of Sonnblick on Aug. 27 and 28, 1887. Results showed 2.05 volume parts in 10,000 at 4.0°C. and 529 mm. pressure with S wind; and 2.36 volume parts at 5.0°C. with 529 mm. pressure. *Subject Headings:* **1. Carbon dioxide 2. Mountain air 3. Sonnblick, Austria.**

3B–95 551.508.95:551.510.14

Wolpert, A., **Über kontinuierlich selbstthätige Luftprüfer.** [Continuous automatic air analyzers.] *Chemisches Central-Blatt, 3. Folge*, 18:94–95, **1887. NN**—An ingenious device, based on the principle of a color changing alkali indicator, is described in detail. *Subject Heading:* **1. Carbon dioxide apparatus.**

1888

3B–96 551.510.41(02)

Sachsse, Robert, **Die Kohlensäure der Atmosphäre.** [Carbon dioxide in the atmosphere.] (In his: **Lehrbuch der Agrikulturchemie.** Pt. I. **Die Atmosphäre.** Leipzig, H. Hessel, **1888.** p. 8–17. tables, 23 refs.) **DA**—Concise and basic exposition of the general knowledge of the problem. The variations of carbon dioxide amount in the air, depending on the effect of ground and sea, on difference in altitude, on local features and on many other factors, are discussed and shown in figures. *Subject Headings:* **1. Carbon dioxide variations 2. Textbooks.**

1889

3B–97 551.508.95:551.510.41

Lunge, Georg and Zeckendorf, A., **Zur minimetrischen Bestimmung der Luftkohlensäure.** [Minimetric determination of carbon dioxide in the air.] *Chemisches Central-Blatt, 4. Folge*, 1:143, **1889. NN**—The authors adopt the principle of ANGUS SMITH's minimetric method, but employ a dilute standard solution of sodium carbonate, colored with phenolophthalein, and ascertain the volume of air required to produce discoloration by the conversion of the normal into the hydrogen carbonate. *Subject Heading:* **1. Carbon dioxide measurement.**

3B–98 551.508.95:551.510.41

Schydlowski, F., **Bestimmungen des Kohlensäuregehaltes in der Luft.** [Estimation of carbon dioxide in the air.] *Zeitschrift für analytische Chemie*, Wiesbaden, 27:712–721, **1889. DLC**—The method is based on the fact that gases of unequal specific gravity, separated by a porous plate, will diffuse until a certain difference in pressure on the two sides of the plate is attained. Comparison of the indications of the instrument with gravimetric determinations, covering a wide range, shows an agreement sufficiently close for practical purposes. *Subject Heading:* **1. Carbon dioxide apparatus.**

3B–99 551.510.41(474.2)

von Frey, Eugen, **Der Kohlensäuregehalt der Luft in und bei Dorpat bestimmt in den Monaten September 1888 bis Januar 1889.** [The content of carbon dioxide in the air, in and near Dorpat, determined from Sept. 1888 through Jan. 1889 inclusive.] Inaug. Diss.—Dorpat, **1889.** 49 p. tables, 5 refs. **DWB**—A modification of PETTENKOFER's method was applied. Results of simultaneous measurements of carbon dioxide content and several meteorological elements are given in tables. *Subject Headings:* **1. Carbon dioxide data 2. Dorpat, Estonia.**

1890

3B–100 551.508.95:551.510.41

Bitter, H., **Über Methoden zur Bestimmung des Kohlensäuregehaltes der Luft.** [Methods for determining the carbon dioxide content in the air.] *Chemisches Central-Blatt, 4. Folge*, 2:792–794, **1890. DLC**—A thorough survey of methods used for measuring the carbon dioxide content in the air, with remarks on their accuracy. *Subject Heading:* **1. Carbon dioxide measurement.**

3B–101 551.508.95:551.510.41

Haldane, J. S. and Pembrey, M. S., **An improved method of determining moisture and carbonic acid in air.** *Philosophical Magazine*, London, New Ser., 29:309–331, **1890.** 2 figs., 3 tables, 28 refs. **DLC**—The search for an accurate means of determining the carbon dioxide and moisture in the air was undertaken chiefly for the purpose of solving the problems connected with the respiratory exchange of animals, but is of equal interest for the solution of meteorological and hygienic problems. The results of preliminary experiments showed that the gravimetric method might be used for the animal respiration apparatus and must be capable of giving much more accurate results than those obtained before. *Subject Headings:* **1. Carbon dioxide measurement 2. Physiology.**

1891

3B–102 551.508.95:551.510.41

Lebedinzeff, Arsenius, **Neue Modification der Dalton-Pettenkofer'schen Methode zur Bestimmung der Kohlensäure in der Luft.** [Modification of Dalton-Pettenkofer's method of estimating carbon dioxide in the air.] *Zeitschrift für analytische Chemie*, Wiesbaden, 30:267–279, **1891. DLC**—The modification consists essentially in protecting completely the barium solution from contact with unpurified air or with rubber at any stage of the process. Tests made in Odessa and its neighborhood ranged from 2.88 to 3.34 volume parts per 10,000. *Subject Headings:* **1. Carbon dioxide measurement 2. Urban air 3. Odessa, U.S.S.R.**

1892

3B–103 551.508.95:551.510.41

Gill, August H., **Die Bestimmung der Kohlensäure der Luft in Gebäuden.** [Determination of carbon dioxide in the air of buildings.] *Chemisches Central-Blatt, 4. Folge*, 4:939, **1892. NN**—A modification of PETTENKOFER's method is described in detail. *Subject Headings:* **1. Carbon dioxide measurement 2. Indoor air.**

3B–104 551.510.41

*Pushner, H., **Untersuchungen über den Kohlensäuregehalt der Atmosphäre.** [Investigations of the content of carbon dioxide in the atmosphere.] *Forschungen auf dem Gebiete der Agrikulturphysik*, 15:296–383, **1892.** tables, 4 refs. **DA**—A very thorough survey of the variations in the content of carbon dioxide in the air. The influences of day and night, of city, forest and field conditions, and various meteorological factors are studied thoroughly and a number of authentic records of measurements presented. *Subject Heading:* **1. Carbon dioxide variations.**

3B–105 551.510.41

Spring, Walter Victor, **Recherches sur la composition de l'atmosphère.** [Research on the composition of the atmosphere.] *Ciel et Terre*, 13:239–242, **1892.** ref. **DLC**—During a two year period 525 measurements of the carbon dioxide content in the air were made in Gembloux and the results obtained showed that the average value was 2.94 liters of CO_2 in 10,000 liters of air, absolute maximum 3.54 and absolute minimum 2.60. Relations of the variations of carbon dioxide quantities with wind direction, pressure and other meteorological factors are discussed. *Subject Headings:* **1. Carbon dioxide 2. Urban air 3. Gembloux, Belgium.**

3B–106 551.510.41:581.2

Schloesing, Alphonse Théophile, **Sur les échanges d'acide carbonique et d'oxygène entre les plantes et l'atmosphère.** [The interchange of carbon dioxide and oxygen between plants and the atmosphere.] *Académie des Sciences, Paris, Comptes Rendus*, 115:1017–1020, **1892. DLC**—The proportion of the volume of carbon dioxide depletion to that of the oxygen increase due to the action of plants during the six or eight weeks of their growth was found much below unity. *Subject Headings:* **1. Carbon dioxide 2. Carbon dioxide cycle.**

1893

3B–107 551.510.41:550.4

Morris, James, **The chemical constitution of the atmosphere, and its bearing on geological changes.** *Chemical News*, London, 67:209–210, **1893. NN**—Remarks on PHIPSON's views of the historical development of atmospheric composition, taking into account the process of mineralization, which occurred without pressure when a plentiful supply of carbon dioxide was present. *Subject Headings:* **1. Carbon dioxide 2. Geochemistry 3. Atmospheric composition.**

3B–108 551.510.41

Palmqvist, A., **Undersökningar öfver atmosferens kolsyrehalt.** [Investigation of the content of carbon dioxide in the atmosphere.] (*K.*) *Svenska Vetenskapsakademiens, Handlingar*, 18(2):1–39,

1892–93. fig., tables, 4 refs. **DLC**—Analysis of 395 air tests gave the mean value of carbon dioxide content as 3.12 in 10,000. The air of the northern part of the Atlantic Ocean proved to be unusually poor in carbon dioxide. In places where the vegetation is well developed the content of carbon dioxide changes with the seasons; lowest content is in summer, highest—early in the spring and late fall, when no vegetation is found but the temperature is still above the freezing point. Variations of carbon dioxide content have no correlation with pressure, snow or rain. *Subject Headings:* **1. Carbon dioxide variations 2. Stockholm, Sweden 3. Atlantic Ocean.**

3B–109 551.508.95:551.510.41

Pettersson, Sven Otto and Palmqvist, A., **Apparat zur Bestimmung des atmosphärischen CO_2-Gehaltes.** [Apparatus for determining the content of CO_2 in the atmosphere.] *Forschungen auf dem Gebiete der Agrikulturphysik*, 16(1/2):173–176, **1893.** plate, ref. **DA**—Apparatus for analysis of carbon dioxide content in the air is discussed in detail. The accuracy of measurements is claimed to be 0.001%. *Subject Heading:* **1. Carbon dioxide apparatus.**

3B–110 551.510.41:550.4

Phipson, Thomas Lamb, **The chemical history of the atmosphere.** *Chemical News*, London, 68:75, **1893.** ref. **NN**—The chemical history of the atmosphere from its origin to our day is summarized briefly. In the primordial atmosphere, which was composed of nitrogen, volcanic action produced large quantities of carbon dioxide and water. Oxygen was later produced by plants from the carbon dioxide supplied by volcanic action, and it continued to increase in quantity so that animal life became possible. At the same time carbon dioxide diminished, as deduced from the fact that the strata of the earth contain immense deposits of carbon which were originally present in the air as carbon dioxide. The diminution of carbon dioxide still continues and the latest measurements have shown a decided decrease in the last fifty years from 0.05 to 0.03 volume parts. *Subject Headings:* **1. Carbon dioxide 2. Atmospheric evolution.**

1894

3B–111 551.510.41

Andrée, Salomon August, **Über die Kohlensäure der Atmosphäre.** [On the carbon dioxide in the atmosphere.] (*K.*) *Svenska Vetenskapsakademiens, Förhandlingar*, 51:355–371, **1894.** 7 tables, 7 refs. **DLC**—Air samples were taken at different altitudes during balloon flights and analyzed for carbon dioxide content. Results, presented in table, do not confirm the conclusions made formerly by Palmqvist in Stockholm and Selanders in Waxholm that carbon dioxide decreased with altitude. The findings show that the proportions of carbon dioxide obtained at different altitudes are very close to those found near the ground. The mean value is 3.23 volume parts in 10,000 volume parts of air at 1000–3000 m. and 3.24 at 3000–4300 m. Some relation with wind direction and pressure areas were established. *Subject Headings:* **1. Carbon dioxide 2. Upper atmosphere.**

3B–112 551.508.95:551.510.41

Cohen, Julius Berend and Appleyard, G., **Popular method of estimating carbon dioxide in air.** *Chemical News*, London, 70:111, **1894.** fig. **NN**—The apparatus is described and schematically presented. Dilute lime-water, colored with phenophthalein containing insufficient lime to combine with the carbon dioxide present, is shaken with the sample of air; the rate of absorption of the gas varies with its volume. The time required to discolor the indicator will give the quantity of dioxide present. *Subject Heading:* **1. Carbon dioxide apparatus.**

3B–113 551.508.95:551.510.41

Theich, Max, **Die Methode von Pettersson and Palmquist zur Bestimmung der Kohlensäure in der Luft.** [The method of Pettersson and Palmquist for determining the carbon dioxide in the air.] *Chemisches Central-Blatt, 4. Folge*, 6:105, **1894.** **NN**—Results of measurements obtained with this apparatus have been compared with those obtained by Pettenkofer's method and only small differences were found. *Subject Heading:* **1. Carbon dioxide measurement.**

3B–114 551.510.41:551.521.3

Trabert, Wilhelm, **Absorption und diffuse Reflexion der Atmosphäre.** [Absorption and diffuse reflection of the atmosphere.] *Meteorologische Zeitschrift*, 11:236–238, **1894.** 4 refs. **DLC**—Gives data of the absorption lines of carbon dioxide, water vapor and other elements. Discussing Langley's and Paschen's investigations, the author stresses the importance of Paschen's findings which might prove that all the dark lines in the solar spectrum coincide with the absorption lines of carbon dioxide and water vapor. *Subject Headings:* **1. Carbon dioxide 2. Infrared absorption.**

1896

3B–115 551.510.41:551.521.3:551.583.7

Arrhenius, Svante, **On the influence of carbonic acid in the air upon the temperature of the ground.** *London, Edinburgh and Dublin Philosophical Magazine*, 5th Ser., 41:237–276, **1896.** 7 tables, refs., 4 equations. **DLC**—Atmospheric absorption of solar radiation by carbon dioxide and the influence of heat absorbing gases in the atmosphere upon the mean temperature of the ground are studied in detail. The secular variations of carbon dioxide content in the air were analyzed and geological consequences considered. *Subject Headings:* **1. Carbon dioxide 2. Infrared absorption 3. Geological climates.**

3B–116 551.508.95:551.510.41

Gillert, E., **Welchen wissenschaftlichen Wert haben die Resultate der Kohlensäuremessungen nach der Methode von Dr. med. H. Wolpert.** [What is the scientific value of the results of carbon dioxide measurements obtained by Dr. Wolpert's method.] *Chemisches Central-Blatt*, 4. *Folge*, 7:822, **1896.** **NN**—Criticism of the apparatus and consideration of the range of errors. *Subject Heading:* **1. Carbon dioxide apparatus.**

3B–117 551.508.95:551.510.41

Heidenhein, Heinrich, **Estimation of carbonic anhydride by absorption.** *American Chemical Society, Journal*, 18:1–7, **1896.** **DLC**—Detailed description of a method based on two stoppered U-shaped absorption tubes containing soda lime. *Subject Heading:* **1. Carbon dioxide apparatus.**

3B–118 551.508.95:551.510.41

Henriet, H., **Dosage rapide de l'acide carbonique dans l'air et les milieux confins.** [Rapid determination of carbon dioxide in the air and in confined places.] *Académie des Sciences, Paris, Comptes Rendus*, 123:125–127, **1896.** table. **DLC**—Investigations of carbon dioxide in the air and in confined localities were made by means of the following reaction: on adding sulphuric acid to a solution of neutral potassium carbonate, which was colored red by a drop of phenolphthalein, the coloration disappears when half the carbon dioxide of the carbonate is fixed upon the undecomposed carbonate, converting it into bicarbonate. *Subject Headings:* **1. Carbon dioxide measurement 2. Indoor air.**

3B–119 551.508.95:551.510.41

Symons, William H. and Stephens, F. R., **Carbon dioxide. Its volumetric determination.** *Chemical Society of London, Transactions*, 69:869–881, **1896.** 3 figs. **DLC**—Discussion of various methods of carbon dioxide measurement: gravimetric, volumetric, nephalometric, minimetric and others. A special piece of apparatus was constructed by the authors which can measure any volume of carbon dioxide from 1 to 50 cc. with an error of about 0.01 cc. *Subject Headings:* **1. Carbon dioxide measurement 2. Carbon dioxide apparatus.**

1897

3B–120 551.510.41:551.583.7

Chamberlin, Thomas Chrowder, **A group of hypotheses bearing on climatic changes.** *Journal of Geology*, Chicago, 5(7):653–683, **1897.** 5 tables, 7 refs. **DLC**—The atmospheric composition is considered of supreme importance in geological history. The variations of the content of atmospheric gases are discussed. Decrease of carbon dioxide in the air during certain phases has been noticed and explained as a result of alteration of surface rocks. *Subject Headings:* **1. Carbon dioxide 2. Geological climates 3. Atmospheric evolution.**

3B–121 551.510.41:551.583.7

Högbom, Arvid Gustaf, **Der Kohlensäuregehalt der Luft.** [The content of carbon dioxide in the air.] *Chemisches Central-Blatt, 5. Folge*, 1:452, **1897.** **NN**—Considerations of the variations of carbon dioxide quantities in the air during geological periods and of the processes which could have caused them. *Subject Headings:* **1. Carbon dioxide variations 2. Geological climates.**

3B–122 551.508.95:551.510.41

Lewaschew, W., **Zur Kohlensäurebestimmung in der Luft.** [Determination of carbon dioxide in the air.] *Chemisches Central-Blatt, 5. Folge*, 2:67–68, **1897.** **NN**—A modification of PETTENKOFER's method is described and many details of the whole procedure are given. *Subject Heading:* **1. Carbon dioxide measurement.**

3B–123 551.510.41(73/9)

†Williams, W. Carleton, **Die Menge der in der Atmosphäre vorhandenen Kohlensäure.** [The amount of carbon dioxide in the atmosphere.] *Deutsche Chemische Gesellschaft, Berichte*, Berlin, 30:1450–1456, **1897.** 3 tables, 21 refs. **DLC**—Review of the methods of measuring carbon dioxide and of results obtained by various investigators during the 19th century. The author estimated the amount of carbon dioxide in the center of Sheffield by a modification of PETTENKOFER's method and the results show the average content as being 3.9 parts in 10,000, the maximum 6.22 and minimum 2.80. At a distance of 1.5 miles west of this point the average was 3.27, maximum 5.14 and minimum 2.16. Snow and fog increased the amount present, while rain had no influence. *Subject Headings:* **1. Carbon dioxide measurement 2. Urban air 3. Sheffield, England.**

1898

3B–124 551.510.41:551.583.7

Chamberlin, Thomas Chrowder, **The influence of great epochs of limestone formation upon the constitution of the atmosphere.** *Journal of Geology*, Chicago, 6(6):609–621, **1898.** 8 refs. **DLC**—Theoretical consideration of the process of the exchange of carbon dioxide between the ground, water and the atmosphere in different geological epochs. *Subject Headings:* **1. Carbon dioxide cycle 2. Atmospheric evolution.**

3B–125 551.510.41

Lévy, Albert and Henriet, H., **L'acide carbonique de l'air.** [Carbon dioxide in the air.] *Académie des Sciences, Paris, Comptes Rendus*, 126:1651–1653, **1898.** 3 tables. **DLC**—Investigations made by means of the author's method showed interesting results regarding the method itself and the problems of carbon dioxide variations and sources of origin. *Subject Heading:* **1. Carbon dioxide measurement 2. Carbon dioxide variations.**

3B–126 551.510.41

Lévy, Albert and Henriet, H., **L'acide carbonique atmosphérique.** [Atmospheric carbon dioxide.] *Académie des Sciences, Paris, Comptes Rendus*, 127:353–355, **1898.** table, 2 refs. **DLC**—Daily examination of atmospheric carbon dioxide was made in the preceding twenty years. Simultaneous estimations with potash and baryta gave interesting results. In the city of Paris baryta gives decidedly higher figures. *Subject Headings:* **1. Carbon dioxide measurement 2. Urban air.**

3B–127 551.510.41(264)(8)

*Troili-Petersson, Gerda, **Über den Kohlensäuregehalt der Atmosphäre.** [On the content of carbon dioxide in the atmosphere.] (*K.*) *Svenska Vetenskapsakademiens, Handlingar*, Afd. 2, 23(6):1–17, **1898.** 4 tables, 4 refs. **DLC**—Measurements of carbon dioxide were made in the air of the South Atlantic and Patagonia. Data are presented in tables. The atmosphere over the Atlantic Ocean contained more carbon dioxide in the cold regions than in the tropical ones. The air in Patagonia contained less carbon dioxide than the air of Scandinavia, but more than the air of the adjoining sea. *Subject Headings:* **1. Carbon dioxide distribution 2. Atlantic Ocean 3. Patagonia, South America.**

1899

3B–128 551.510.41:551.583.7

Chamberlin, Thomas Chrowder, **An attempt to frame a working hypothesis of the cause of glacial periods on an atmospheric basis.** *Journal of Geology*, Chicago, 7:545–584, 715–787, **1899.** **DLC**—Discusses in great detail the probable variations in the quantity of carbon dioxide in the atmosphere during different geological periods to which climatic effects are attributed (warm climate with much CO_2, cold climate or glaciation with little CO_2). Auxiliary effects are also considered, including a reversal of the oceanic circulation. The warm periods and great evaporation in low latitudes caused the saline surface water to sink to the bottom where it travelled to high latitudes, retaining its heat and coming to the surface to cause warm, polar climates. (*Same abstract* as **G–12** in July 1950 *Meteorological Abstracts.*) *Subject Headings:* **1. Carbon dioxide 2. Geological climates.**—*C.E.P.B.*

3B–129 551.510.41(44)

de Tierry, Maurice, **Dosage du gaz carbonique au Mont Blanc.** [Amount of carbon dioxide on Mont Blanc.] *Académie des Sciences, Paris, Comptes Rendus*, 129:315–316, **1899.** table, ref. **DLC**—In two places on Mont Blanc, situated at 3050 m. and 1080 m., measurements of carbon dioxide content, temperature and pressure were made and it was found that the quantity of carbon dioxide diminished very little with altitude. *Subject Headings:* **1. Carbon dioxide 2. Mountain air 3. Mont Blanc, France.**

3B–130 551.510.41(787):551.25

Ward, Robert DeCourcy, **Carbonic acid in Death Gulch.** *Science*, New York, 9:459, **1899. DLC**—Brief note about the amount of carbon dioxide in the air, observed in volcanic districts. Sometimes this amount was large enough to cause the death of animals which stray into the hollows where the gas collects. Death Gulch in the Yellowstone National Park is a region of this type. *Subject Headings:* **1. Carbon dioxide 2. Volcanoes 3. Death Gulch, Wyoming.**

1900

3B–131 551.510.41:551.521.3(46)

†Ångström, Knut, **Über die Bedeutung des Wasserdampfes und der Kohlensäure bei der Absorption der Erdatmosphäre.** [The importance of water vapor and carbon dioxide in the absorption of the earth's atmosphere.] *Annalen der Physik*, Leipzig, 4. Folge, 3:720–732, **1900.** 4 figs., 4 tables, 18 refs. **DLC**—Continuation of LECHER's research on the importance of carbon dioxide in atmospheric absorption. During a trip to Tenerife (1896), the solar radiation was studied at different heights above sea level and it was found that the absorption of solar radiation through carbon dioxide occurs in the upper layers of the atmosphere. Experiments with other radiating bodies led to the conclusion that only 16% of the earth's radiation could be absorbed by carbon dioxide. *Subject Headings:* **1. Carbon dioxide 2. Infrared absorption 3. Tenerife, Canary Islands.**

3B–132 551.510.41

†*Letts, Edmund Albert and Blake, R. F., **The carbonic anhydride of the atmosphere.** *Royal Dublin Society, Scientific Proceedings*, New Ser., 9(2):107–270, March **1900.** 6 figs., 3 plates, tables, numerous refs. **DLC**—An extensive and thorough study, beginning with the statement that the existence of carbonic anhydride in the air was first demonstrated by DR. BLACK of Edinburgh, between 1752 and 1754. Methods of determination are described and discussed. Ample data obtained by other scientists on the amount of carbon dioxide in the atmosphere are presented in a table. Causes of variations are analyzed and the influence of seasons, day and night, vegetation, rain and snow, sun and clouds, wind and local factors are studied. An extensive bibliography is added. *Subject Headings:* **1. Carbon dioxide measurement 2. Carbon dioxide variations.**

1901

3B–133 551.510.41:551.521.3

*Ångström, Knut, **Ueber die Abhängigkeit der Absorption der Gase, besonders der Kohlensäure, von der Dichte.** [On the dependence of the absorption by gases, especially by carbon dioxide, on their density.] *Annalen der Physik*, Leipzig, 4. Folge, 6:163–173, **1901.** 5 tables, 9 refs. **DLC**—Experiments were carried out with a special apparatus. Data obtained are presented in tables showing the variation of absorption by carbon dioxide associated with the increase of the density of the gas. *Subject Headings:* **1. Carbon dioxide data 2. Infrared absorption.**

3B–134 551.510.41:551.521.3

Ångström, Knut, **Einige Bemerkungen zur Absorption der Erdstrahlung durch die atmosphärische Kohlensäure.** [Some remarks on the absorption of the earth's radiation through the atmospheric carbon dioxide.] (*K.*) *Svenska Vetenskapsakademiens, Förhandlingar*, 58(6):381–389, **1901. DLC**—Discussion of the rôle of carbon dioxide and vapor in the absorption of solar and earth radiation by the atmosphere. The density and thickness of the gas layer are considered. Experiments made by other scientists are cited and analyzed. *Subject Headings:* **1. Carbon dioxide 2. Infrared absorption 3. Absorption of terrestrial radiation.**

3B–135 551.510.41

†Arrhenius, Svante, **Ueber die Wärmeabsorption durch Kohlensäure und ihren Einfluss auf die Temperatur der Erdoberfläche.** [Heat absorption by carbon dioxide and its effect on the temperature of the ground.] (*K.*) *Svenska Vetenskapsakademiens, Förhandelingar*, 58(1):25–58, **1901.** 3 figs., tables, 15 refs. **DLC**—A series of experimental determinations of the absorption of heat by carbon dioxide was made and the former calculations revised on this new basis, by which somewhat lower values for the influence of the atmospheric carbon dioxide were obtained. The effect of pressure has not been taken into account. Results obtained by other scientists are discussed. *Subject Headings:* **1. Carbon dioxide 2. Infrared absorption.**

3B–136 551.510.41:551.583.7

Balley, Willis, **Climate and carbonic acid.** *Popular Science Monthly*, New York, 59:242–256, **1901.** 5 refs. **DLC**—A review of CHAMBERLIN's "Working hypothesis of a cause of glacial epochs." The fundamental hypothesis is that variations of the atmospheric content of carbon dioxide have

been the direct cause of variations of climate, therefore all factors which cause a lack or abundance of carbon dioxide are considered and their activity outlined and discussed. *Subject Headings:* **1. Carbon dioxide 2. Geological climates.**

3B–137 551.510.41:551.583.7

†Ekholm, Nils, **On the variations of the climate of the geological and historical past and their causes.** *Royal Meteorological Society, Quarterly Journal*, 27(117):1–61, Jan. **1901.** 3 figs., 7 tables, numerous refs. **DLC**—One chapter of this extensive survey is dedicated to the variations in the amount of carbon dioxide of the atmosphere as the principal causes of the great climatic variations during geological ages. *Subject Headings:* **1. Carbon dioxide 2. Geological climates.**

3B–138 551.510.41:551.521.3

†*Koch, John, **Beiträge zur Kenntnis der Wärmeabsorption in Kohlensäure.** [Contribution to the knowledge of heat absorption by carbon dioxide.] (*K.*) *Svenska Vetenskapsakademiens, Förhandlingar*, 58(6):475–488, **1901.** 2 figs., 10 tables, 15 refs. **DLC**—The capacity of absorption of different layers of carbon dioxide with constant pressure of $\frac{1}{2}$, 1 and 2 atmospheres was determined. Apparatus and methods used for this experiment are described. *Subject Headings:* **1. Carbon dioxide data 2. Infrared absorption.**

1902

3B–139 551.510.41:581.1:533.15

Brown, Horace T. and Escombe, F., **The influence of varying amounts of carbon dioxide in the air on the photosynthetic process of leaves and the mode of growth of plants.** *Royal Society of London, Proceedings*, 70:397–413, April **1902.** 6 plates, ref. **DLC**—Describes experiments on plants grown in ordinary air and in air containing 11.4 parts per 10,000 of CO_2. In determining the rates of gaseous diffusion of atmospheric carbon dioxide through multiperforate diaphragms, covering chambers containing perfect absorbents, it was found that the rate of absorption of the carbon dioxide is strictly proportional to its partial pressure. Under this condition, the amount of carbon dioxide passing through the diphragm in a given time is also directly proportional to the density of that gas in the moving air stream which flows over the outer surface of the diaphragm. *Subject Headings:* **1. Carbon dioxide diffusion 2. Plant ecology 3. Diffusion of gases.**

3B–140 551.510.41:551.584.65

*Clowes, Frank and Murphy, Shirley F., **Examination of the atmosphere of the central London Railway.** *London County Council* [*Publication*] No. 615 [**1902**]. 21 p. diagr., 7 tables. **DLC**—Chemical, physical and bacteriological examinations of the atmosphere were made and results presented in: "Report by the chemist" and 2) "Report by the medical officer of health." Measurements of carbon dioxide content, made in various places (tunnels, coaches, post office lifts, etc.), are presented in tables. About 22% of the samples collected contained less than twice as much carbon dioxide as that found in outside air and 34% of the samples contained less than two and a half times as much. *Subject Headings:* **1. Carbon dioxide data 2. Indoor air.**

3B–141 551.510.41:581.1

Farmer, J. Bretland and Chandlier, S. E., **On the influence of an excess of carbon dioxide in the air on the form and internal structure of plants.** *Royal Society of London, Proceedings*, 70:413–423, April **1902.** 5 figs., 2 refs. **DLC**—Experiments on plants, grown in an atmosphere with increased amount of carbon dioxide, showed that the growth of the internodes was checked, the growth in size of the leaves was arrested at an early stage, numbers of stomata considerably increased, but no alteration could be detected in the roots. *Subject Headings:* **1. Carbon dioxide 2. Plant ecology.**

3B–142 551.510.41(09)

Keller, Harry Frederick, **The gases of the atmosphere.** *Scientific American, Supplement*, 53(1378):22082–22084, May **1902.** **DLC**—A comprehensive review, in narrative form, citing in chronological order the discoveries made in the fields of chemistry and atmospheric composition. Begins with conceptions and doctrines of ARISTOTLE. The works of LAVOISIER, CAVENDISH, HUMBOLDT, GAY-LUSSAC, DALTON and RAMSAY are outlined. The article covers the period from ancient times to the discoveries of rare gases and their proportions in the atmosphere. *Subject Headings:* **1. Carbon dioxide 2. History of meteorology 3. Atmospheric composition.**

1904

3B–143 551.508.95:551.510.41:612

Jaquet, A., **Ein neuer Apparat zur Untersuchung des respiratorischen Stoffwechsels des Menschen.** [New apparatus for investigation of the respiratory metabolism of man.] *Naturforschende*

Gesellschaft in Basel, Verhandlungen, 15:252–271, **1904.** 4 tables, 2 refs. **DLC**—New apparatus for analysis of air constituents and especially oxygen and carbon dioxide is described in detail and CO_2 percentages are given. The apparatus is applied in physiological research for the estimation of carbon dioxide production. *Subject Headings:* **1. Carbon dioxide apparatus 2. Physiology.**

3B–144 551.510.41(988)

†Krogh, August, **The abnormal CO_2 percentage in the air in Greenland.** *Denmark, Kommissionen for Ledelsen af de geologiske og geographiske Undersøgelser i Grønland, Meddelelser om Grønland*, 26:409–434, **1904.** 2 tables, 20 refs. **DLC**—Series of analyses of the atmospheric air were made by the author during his voyage round the Island of Disko in West Greenland. Results are given in tables. The percentage of carbon dioxide was found to be very great (up to 0.07) and extremely variable, being high when winds blew from the north and west and low when winds blew from the south. This phenomenon is believed to be due to the liberation of the gas from the sea. Estimates made by Dr. Moss in 1875 (0.064) are confirmed by these findings. *Subject Headings:* **1. Carbon dioxide variations 2. Marine influences 3. Disko Island, North Atlantic Ocean.**

3B–145 551.510.41:551.508.95:551.464

Krogh, August, **On the tension of carbonic acid in natural waters and especially in the sea.** *Denmark, Kommissionen for Ledelsen af de geologiske og geographiske Undersøgelser i Grønland, Meddelelser om Grønland*, 26:333–405, **1904.** 9 figs., tables, refs. **DLC**—Description of the methods and apparatus used to determine the percentage of carbon dioxide in the air. Results of measurements are given in another paper. The author has found that the pressure of carbon dioxide of the ocean surface often differs from that of the atmosphere and may cause considerable absorption or elimination of the gas. *Subject Headings:* **1. Carbon dioxide measurement 2. Carbon dioxide apparatus 3. Marine influences.**

1905

3B–146 551.510.41(42)

*Brown, Horace T. and Escombe, F., **On the variations in the amount of carbon dioxide in the air of Kew during the years 1898–1901.** *Royal Society of London, Proceedings, Ser. B*, 76:118–121, **1905.** 2 tables, 3 refs. **DLC**—An exact and simple method for measuring the content of carbon dioxide in the atmosphere is described. The errors do not exceed 0.13 parts per 10,000. Four years of systematic measurements gave the mean value of 2.94 volume parts in 10,000 parts of dry air. Annual variations in Kew showed that the maximum depends more on anticyclones than on the season. *Subject Headings:* **1. Carbon dioxide measurement 2. Carbon dioxide variations 3. Kew, England.**

3B–147 551.510.41:551.464

Hann, Julius, **Der Ozean als Regulator des Kohlensäuregehaltes der Atmosphäre.** [The ocean as a regulator of the content of carbon dioxide in the atmosphere.] *Meteorologische Zeitschrift*, 22(2):89–90, Feb. **1905.** 2 refs. **DLC**—A survey of the research concerning the role of the ocean in the carbon dioxide cycle, presenting briefly important data and concepts. *Subject Headings:* **1. Carbon dioxide exchange 2. Marine influences.**

3B–148 551.510.41:551.464

Harden, H., **Atmospheric and oceanic carbon dioxide.** *Nature*, London, 71:283–284, **1905.** ref. **DLC**—The rôle of the ocean as a regulator of the amount of carbon dioxide in the air is discussed. A simple procedure for the estimation of small quantities of carbon dioxide is described and results of this experiment considered as an indicator for the estimation of the exchange of carbon dioxide between sea and air. *Subject Headings:* **1. Carbon dioxide exchange 2. Marine influences.**

1908

3B–149 551.510.41

Henriet, H. and Bonyssy, M., **Sur l'origine de l'ozone atmosphérique et les causes de variations de l'acide carbonique de l'air.** [On the formation of atmospheric ozone and the cause of variations of the content of carbon dioxide in the air.] *Académie des Sciences, Paris, Comptes Rendus*, 146:977–978, **1908. DLC**—The variations of carbon dioxide content are presumed to be usually affected by the air currents coming from higher regions. Unusual deviations from the normal content are caused by local phenomena. *Subject Headings:* **1. Carbon dioxide variations 2. Upper atmosphere.**

3B–150 551.510.41

Sovetov, S. A., **Ozon i uglekislota v atmosfere.** [Ozone and carbon dioxide in the atmosphere.] *Meteorologicheskiĭ Vestnik*, 18:397, 1908. **DWB**—Review of the results of investigations made by Aurie and Boncie, published in *Semaine Médicale*, 24, 1908. The interrelations between carbon

dioxide and oxygen in the atmosphere are stated. The causes of variations of carbon dioxide quantities are indicated. *Subject Heading:* **1. Carbon dioxide variations.**

1911

3B–151 551.510.41:631.4

Shipchinskiĭ, V., **Soderzhanie uglekisloty v pochvennom vozdukhe.** [Carbon dioxide content in the air in the soil.] *Meteorologicheskiĭ Vestnik*, 21:268, **1911. DWB**—Investigations made by A. Suprunenko to determine the content of carbon dioxide in the air sucked out from various soils are described. According to his findings, more carbon dioxide is contained in the air of soil under plants and less in the bare soil air. The range of these quantities is rather great, but even the minimum quantity exceeds by 2.5 times the amount contained in the atmosphere. *Subject Headings:* **1. Carbon dioxide 2. Soil air.**

1912

3B–152 551.510.41(02)

†*Benedict, Francis Gano, **The composition of the atmosphere with special reference to its oxygen content.** Washington, D. C., Carnegie Institution, **1912.** 115 p. fig., 71 tables, numerous refs. **DLC**—Fundamental and detailed study of the problem. Beginning with a historical account of the development of methods for determining oxygen and early investigations of the composition of the air, further detailed descriptions of apparatus and technique used at the nutrition laboratory in research on this problem follow. Ample quantitative data on the content of oxygen and carbon dioxide, obtained at various places, are presented in tables. The ratio between increment in carbon dioxide and the decrease in oxygen leads to the conclusion that carbon dioxide determinations may be taken as excellent indicators of the oxygen content. *Subject Headings:* **1. Carbon dioxide data 2. Textbooks.**

1913

3B–153 551.510.41(269)

A. V., **Soderzhanie uglekisloty v vysokikh iuzhnykh shirotakh.** [The content of carbon dioxide in high southern latitudes.] *Meteorologicheskiĭ Vestnik*, 23:208–209, **1913. DWB**—Data obtained on two South Pole expeditions showed that the content of carbon dioxide decreases by passing from the middle latitudes of the Southern Hemisphere to the higher latitudes. This decrease probably depends on the low temperature of the Antarctic Ocean, which prevents the dissociation of carbonates in the sea water and the emission of carbon dioxide into the atmosphere. *Subject Headings*: **1. Carbon dioxide distribution 2. Antarctic.**

1915

3B–154 551.510.41(02)

Hann, Julius, **Lehrbuch der Meteorologie.** [Textbook of meteorology.] Leipzig, **1915. DWB**—On p. 7, the distribution of gases in higher layers of the atmosphere is given in figures, computed on the basis of the partial pressure of gases near the ground. *Subject Headings:* **1. Carbon dioxide 2. Upper atmosphere.**

1916

3B–155 551.510.41:537.3

†Kendall, James, **The specific conductivity of pure water in equilibrium with atmospheric carbon dioxide.** *American Chemical Society, Journal*, 38:1480–1497, **1916.** 11 tables, numerous refs. **DLC**—Assumes that carbon dioxide is the only substance in the atmosphere which increases conductivity of water. Carbon dioxide content of the atmosphere and the factors producing its variations are discussed. *Subject Heading:* **1. Carbon dioxide.**

3B–156 551.510.41

*Wigand, Albert, **Die Änderung der Zusammensetzung der Luft mit der Höhe.** [Variation of atmospheric composition with altitude.] *Meteorologische Zeitschrift*, 33:433–438, **1916.** fig., 2 tables, 8 refs. **DLC**—Analyzing the air at different altitudes up to 9000 m., the author came to the conclusion that the content of carbon dioxide decreases and the amount of neon, helium and hydrogen increases with altitude. *Subject Headings:* **1. Carbon dioxide 2. Upper atmosphere.**

1917

3B–157 551.510.41:551.578.11

Loske, E. G., **Otnoshenie pochvy k atmosfernomu vozdukhu i pochvennyĭ vozdukh.** [Relation of the soil to the atmospheric air and the air of the soil.] *Trudy po Sel'sko-khoziaĭstvennoĭ Meteorologii*, 7:601–689, **1917.** tables, refs. **DWB**—Discussion of the problems connected with carbon

dioxide in the air of the atmosphere and in the air of soil. Precipitation analyzed and the average content of carbon dioxide determined as 2 cubic cm. in 1 liter. *Subject Headings:* **1. Carbon dioxide 2. Soil air 3. Rainwater analysis.**

1919

3B–158 551.508.95:551.510.41(489)

Krogh, August, **Composition of the atmosphere, an account of preliminary investigations and a program.** (*K.*) *Danske Videnskobernes Selskob, Math.-fysiske Meddelelser*, 1(2):1–19, **1919.** fig., 11 refs. **DLC**—An apparatus for determining CO_2, O, "N" (N+inert gases) and combustible gases with an accuracy of 0.001 percent is described. The percentage of combustible gases is found to be much less than the commonly assumed value of 0.003 percent. "N" is almost constant. In Copenhagen, the content of carbon dioxide is usually 0.001–0.007 percent greater and a deficit of oxygen is also observed. The analyses gave the composition at the surface as: CO_2—0.03%; O—29.948%. *Subject Headings:* **1. Carbon dioxide measurement 2. Carbon dioxide apparatus 3. Atmospheric composition 4. Copenhagen, Denmark.**

1921

3B–159 551.510.41

Humphreys, William Jackson, **The mass of the atmosphere and of each of its more important constituents.** *Monthly Weather Review*, 49:341, **1921.** 7 refs. **DLC**—Approximate mass of the atmosphere in toto and each of its important constituents are computed. Two assumptions are made: 1) the percentage of several gases is constant in the absence of water vapor throughout the troposphere, and 2) in the stratosphere these gases are distributed as though they were present alone. *Subject Headings:* **1. Carbon dioxide 2. Atmospheric composition.**

3B–160 551.510.41

Livingston, Burton E., **Carbon-dioxide-supplying power of the air.** *Carnegie Institution of Washington, Year Book*, No. 20:71–72, **1921. DWB**—Special experiments were made in order to determine quantitatively the available CO_2 supply in the air. An absorbing surface was exposed to the air and the amount of gas actually absorbed was taken as an average measure for the period of exposure. With low wind velocities the supplying power values were generally low, while periods of high wind gave relatively high values. *Subject Heading:* **1. Carbon dioxide.**

1922

3B–161 551.508.95:551.510.41

Lundegårdh, Henrik, **Neue Apparate zur Analyse des Kohlensäuregehalts der Luft.** [New apparatus for analysis of carbon dioxide content in the air.] *Biochemische Zeitschrift*, Berlin, 131: 109–115, **1922.** 2 figs., 3 tables, 6 refs. **DLC**—Detailed description of apparatus and procedure for measuring the content of carbon dioxide in the air. *Subject Heading:* **1. Carbon dioxide apparatus.**

1924

3B–162 551.510.41(02):581.1

Lundegårdh, Henrik Gunnar, **Der Kreislauf der Kohlensäure in der Natur. Ein Beitrag zur Pflanzenökologie und zur landwirtschaftlichen Düngungslehre.** [Carbon dioxide cycle in nature. A contribution to plant ecology and to the study of agricultural fertilization.] Jena, Gustav Fischer, **1924.** 308 p. 47 figs., tables, refs. **DA**—Extensive study of carbon dioxide in the air for agricultural purposes. The content of carbon dioxide in the free atmosphere and the supplying sources are described in the first two parts of this comprehensive and well arranged book. Influences of meteorological elements, annual periodicity, diffusion and differences between day and night are considered, and the content of carbon dioxide in early epochs is evaluated. *Subject Headings:* **1. Carbon dioxide 2. Carbon dioxide cycle 3. Geological climates 4. Plant ecology 5. Textbooks.**

1927

3B–163 551.510.41

Carpenter, Thorne M. and Fox, Edward L., **Absence of stratification and rapidity of mixing of carbon dioxide in air samples.** *Journal of Biological Chemistry*, Baltimore, 73:379–381, **1927.** 2 tables, ref. **DLC**—The diffusion was found to be rapid and complete even under extreme conditions. No evidence of any stratification. *Subject Heading:* **1. Carbon dioxide.**

3B–164 551.510.41(44)

*Florentin, Daniel, **Sur la composition de l'air des rues de Paris.** [Air composition in the streets of Paris.] *Académie des Sciences, Paris, Comptes Rendus*, 185:1538–1541, **1927.** tables,

2 refs. **DLC**—In various places in Paris, measurements of CO_2 and CO content in the air were made and compared with wind velocity, cloudiness and human activity. A consolidated table of data obtained on different days and at different hours is presented. *Subject Headings:* **1. Carbon dioxide 2. Urban air 3. Paris, France.**

3B–165 551.508.95:551.510.41

Lundegårdh, Henrik Gunnar, **Ein Apparat für volumetrische Kohlensäureanalyse nach einem neuen Prinzip.** [Apparatus for volumetric analysis of carbon dioxide based on a new principle.] *Arkiv for Kemi, Mineralogi och Geologi, Ser. B,* Stockholm, 9(46):1–18, **1927.** 5 figs., 4 tables, 8 refs. **DLC**—Measurements of the volume of carbon dioxide were made with this apparatus, securing an accuracy of +5%. *Subject Heading:* **1. Carbon dioxide apparatus.**

3B–166 551.510.41:551.7

Macgregor, A. M., **The problem of the precambrian atmosphere.** *South American Journal of Science,* 24:155–172, Dec. **1927.** table, 17 refs. Abstracted from reprint. **DWB**—The question of probable changes in the composition of the atmosphere and their influence on geological processes is discussed. Reasons for supposing that great changes must have taken place are cited. A possible sequence in the evolution of the atmosphere is suggested. *Subject Headings:* **1. Carbon dioxide 2. Atmospheric evolution.**

1929

3B–167 551.508.95:551.510.41

Krogh, August and Rehberg, P. Brandt, **CO_2-Bestimmung in der atmosphärischen Luft durch Mikrotitration.** [CO_2 determination in the atmospheric air by microtitration.] *Biochemische Zeitschrift,* Berlin, 205:265–272, **1929.** 2 figs., 2 refs. **DLC**—Detailed description of an apparatus for and method of measurement of carbon dioxide. *Subject Headings:* **1. Carbon dioxide measurement 2. Carbon dioxide apparatus.**

1930

3B–168 551.510.41:551.43

*Reinau, Erich, **Ueber den Kohlensäuregehalt erdnaher Luftschichten im Hochgebirge.** [On the content of carbon dioxide in the surface air layers in high mountains.] *Beiträge zur Geophysik,* 25:178–193, **1930.** 5 figs., 5 tables. **DLC**—Measurements of carbon dioxide were made by the volumetric method, using the slightly modified apparatus of Peterson-Sondén. Results of observations at different places and heights are presented in graphs and tables. It has been found that there is more carbon dioxide in the air over plains than over mountains, but this is only the result of the higher pressure of the gas. *Subject Headings:* **1. Carbon dioxide data 2. Mountain air.**

1932

3B–169 551.510.41:551.510.5

Epstein, P. S., **Über Gasentmischung in der Atmosphäre.** [Separation of gases in the atmosphere.] *Beiträge zur Geophysik,* 35:153–165, **1932.** 4 tables, 3 refs., 29 equations. **DLC**—The author derived the differential equation for atmospheric diffusion under the action of gravity and developed a complete theory of it. The lower part of the atmosphere is uniformly mixed; at very high elevations the gases are completely separated. The height of transition from the first law to the second might be determined by data given in a table. *Subject Headings:* **1. Carbon dioxide 2. Atmospheric diffusion.**

1934

3B–170 551.510.41

Kauko, Yrjö, **Zur Bestimmung der Kohlensäure in der Luft mit Hilfe von p_H-Messungen.** [Determinations of carbon dioxide in the air by means of p_H measurements.] *Zeitschrift für angewandte Chemie,* 47:164, **1934.** **DLC**—Theoretical foundation of a new potentiometric method for determining carbon dioxide. *Subject Heading:* **1. Carbon dioxide measurement.**

1935

3B–171 551.508.95:551.510.41

†Kauko, Yrjö; Carlberg, Julius and Mantere, V., **Eine genaue Methode zur Bestimmung des CO_2-Gehaltes der Luft.** [Accurate method of determining the CO_2 content in the air.] *Zeitschrift für anorganische und allgemeine Chemie,* Leipzig, 223:33–44, **1935.** 2 figs., table, 19 refs., 4 equations. **DLC**—Modification of Kauko's condensation method. Carbon dioxide was condensed in two coils which were submerged in liquid air and by measurements of pressure the content of carbon dioxide was determined. *Subject Heading:* **1. Carbon dioxide apparatus.**

3B–172 551.510.41

Kauko, Yrjö and Carlberg, Julius, **Praktische Ausführung der Kohlensäurebestimmung in Gasmischungen mit Hilfe von p_H-Messungen.** [Practical results of carbon dioxide determination in gas mixtures by means of p_H measurements.] *Zeitschrift für analytische Chemie*, Leipzig, 102:393–411, 1935. 7 figs., 2 tables, 17 refs., 8 equations. **DLC**—Calorimetric and potentiometric methods of carbon dioxide measurement are analyzed theoretically and verified experimentally. *Subject Heading:* **1. Carbon dioxide measurement.**

3B–173 551.510.41:551.510.53

Lepape, Adolphe and Colange, Georges, **Sur la prêsence de la vapeur d'eau et de l'anhydride carbonique dans l'air de la stratosphère.** [The presence of water vapor and carbon dioxide in the air of the stratosphere.] *Académie des Sciences, Paris, Comptes Rendus*, 200:2108–2110, 1935. table, 10 refs. **DLC**—Analyses of upper air samples from heights of 9–16 km. gave 0.03–0.13 percent of carbon dioxide. *Subject Headings:* **1. Carbon dioxide 2. Stratosphere.**

3B–174 551.510.41

Paneth, Fritz Adolph, **The composition of the troposphere and stratosphere.** An address delivered before a joint meeting of the Society with the Imperial College Chemical Society. Dec. 9, 1935. p. 120–132. fig., 8 tables. Abstracted from reprint. **MH-BH**—The amount of carbon dioxide in the troposphere is given for Boston outdoor air and subway. The content in the stratosphere (9–16 km.) is estimated on the average as being 0.06 percent by volume. *Subject Headings:* **1. Carbon dioxide 2. Upper atmosphere.**

1936

3B–175 551.510.41

Haldane, John Scott, **Carbon dioxide content of atmospheric air.** *Nature*, London, 137:575, 1936. **DLC**—Measurements of carbon dioxide content were made with the improved form of the well known HALDANE volumetric gas analysis apparatus, adapted for the estimation of carbon dioxide only. The amount of carbon dioxide in country air at heights from 4 to 70 ft. above ground level varied between 21 and 44 volumes. Diurnal variation was very marked from July to October. The emanation of carbon dioxide from the soil was very obvious. The influence of combustion was equally clear. Important influence of the sea has been established. *Subject Heading:* **1. Carbon dioxide variations.**

3B–176 551.510.41(471.1)

Kauko, Yrjö and Haulio, P., **Einige orientierende Versuche über den Kohlensäuregehalt der Luft über der Stadt Helsingfors.** [Some exploratory investigations of the content of carbon dioxide in the air over Helsinki.] *Suomen Kemistilehti*, Helsinki, 9(7/8):65, 1936. 3 tables, 2 refs. **DLC**—Measurements of carbon dioxide content in the air over Helsinki were made at different altitudes reaching 1500 m. Results are given in a table. *Subject Headings:* **1. Carbon dioxide 2. Urban air 3. Helsinki, Finland.**

3B–177 551.510.41

Kling, André; Rouilly, Maurice and Claraz, Maurice, **Methode simple pour apprecier le taux d'oxyde de carbone dans une atmosphère.** [Simple method for estimating the amount of carbon dioxide in an atmosphere.] *Academie des Sciences, Paris, Comptes Rendus*, 202:1178–1180, 1936. **DLC**—The method is based on the oxidation of CO by means of "Hopkalit" and the calorimetric determination of carbon dioxide. *Subject Heading:* **1. Carbon dioxide measurement.**

3B–178 551.510.41:551.510.53

Thomson, Andrew, **On the composition of the upper atmosphere.** *American Meteorological Society, Bulletin*, 17:69–70, 1936. 5 refs. **DLC**—A concise review of data obtained by various investigators on the content of gases in the upper atmosphere. Measurements made in stratospheric balloons by Russians, and results of investigations made by LE PAGE, COLANGE, REGENER, PANETH and GLÜCKAUF are briefly presented. *Subject Headings:* **1. Carbon dioxide 2. Upper atmosphere.**

1937

3B–179 551.510.41(739)

Carpenter, Thorne Martin, **The constancy of the atmosphere with respect to carbon dioxide and oxygen content.** *American Chemical Society, Journal*, 59:358–360, 1937. 5 tables, 6 refs. **DLC**—Three series of air samples, taken at different places, have been analyzed for carbon dioxide and oxygen content by means of an apparatus on which readings are estimated at 0.001%. The grand average of all three series gave 0.031% for carbon dioxide and 20.939% for oxygen. There was no evidence that variation in season or proximity of large consumers of fuel caused any measurable

difference in carbon dioxide and oxygen content of atmospheric air. *Subject Headings:* **1. Carbon dioxide 2. Eastern United States.**

3B–180 551.510.41

†Kauko, Yrjö and Yli-Uotila, Tyyne, **Zur Kenntnis des absoluten Kohensäuregehaltes der Luft.** [Contribution to the study of the absolute content of carbon dioxide in the air.] *Meteorologische Zeitschrift*, 54:30–33, 1937. fig., table, 19 refs., equations. **MH-BH**—A concise review and discussion of various methods of determining the carbon dioxide content in the air. *Subject Heading:* **1. Carbon dioxide measurement.**

3B–181 551.510.41

†Paneth, Fritz Adolph, **The chemical composition of the atmosphere.** *Royal Meteorological Society, Quarterly Journal*, 63:433–438, 1937. 32 refs. **DWB**—Discussion of the content of all known gases in the atmosphere. The carbon dioxide content is taken as 0.03 percent. The production of carbon dioxide by the combustion of fuel and the respiratory exchange of organisms is similar in amount to the quantity of oxygen used up, while the assimilation of plants diminishes the carbon dioxide to an extent equal to the increase in oxygen. *Subject Heading:* **1. Carbon dioxide.**

3B–182 551.510.41

Paneth, Fritz Adolph, **Chemical exploration of the stratosphere.** *Nature*, London, 139(3509–3510):180–182, 220–223, 1937. 3 figs., 3 tables, 6 refs. **DLC**—General tables of composition of the atmosphere and density of atmospheric gases are given. The possible change of the content of constituent gases with altitude is discussed on the basis of the kinetic theory. A statement regarding the constant percentage of the main gases in the whole troposphere is made which is contrary to statements by WIGAND, TETUS and H. LANGE in the older literature. This equal distribution is an effect of stirring of the troposphere by winds. A device for automatic air sampling is described and the results, beginning from 1935, are presented in a table showing helium and oxygen content at various altitudes. *Subject Headings:* **1. Carbon dioxide measurement 2. Upper atmosphere 3. Atmospheric composition.**

1938

3B–183 551.510.41:551.509.62(73)

Callendar, G. S., **The artificial production of carbon dioxide and its influence on temperature.** *Royal Meteorological Society, Quarterly Journal*, 64:223–237, 1938. 5 figs., 9 tables, 16 refs. **DWB**—The paper deals with the effect of variations in the amount of carbon dioxide in the atmosphere on long wave radiation from the atmosphere to the earth and the consequent effect on temperature. Calculated annual addition of carbon dioxide to the atmosphere from fuel combustion is 4300 million tons. Examination of the amount of carbon dioxide in the atmosphere, determined by BROWN around 1900 and more recently in the eastern United States, showed that the actual increase and the calculated one agree. The increase of carbon dioxide is causing an increase of mean temperature at the rate of 0.003°C. per year. Temperature observations for 50 years from different parts of the globe show an increase of 0.005°C. a year. *Subject Headings:* **1. Carbon dioxide 2. Temperature trends 3. United States.**

3B–184 551.510.41:551.510.5

Mitra, Sisir Kumar and Rakshit, H., **Distribution of the constituent gases and their pressures in the upper atmosphere.** *Indian Journal of Physics*, Calcutta, 12:47–61, 1938. 5 tables, 6 refs., 8 equations. **DLC**—Calculation of the upper limit of the diffusive equilibrium level in the atmosphere has been made admitting certain assumptions regarding the temperature and the constituent gases of the upper atmosphere. *Subject Headings:* **1. Carbon dioxide 2. Upper atmosphere 3. Diffusion of gases.**

3B–185 551.510.41:551.510.53(73/9)

R.T.P.W., **Observations made in the highest stratosphere flight.** *Nature*, London, 141:270–274, 1938. 3 figs. **DLC**—Air samples, obtained in the stratosphere over the American continent during the flight of "Explorer II," were analyzed and the amount of carbon dioxide found to be $=0.029\pm0.002$ percent. This seems to be the only reliable data published so far of the carbon dioxide content in the upper air. *Subject Headings:* **1. Carbon dioxide 2. Stratosphere.**

1939

3B–186 551.510.41:551.464(268)(481)

Buch, Kurt, **Kohlensäure in Atmosphäre und Meer an der Grenze zum Arktikum.** [Carbon dioxide in the atmosphere and sea on the border of the Arctic.] *Åbo, Finland, Akademi, Acta Mathematica et Physica*, 11(12):1–41, 1939. 4 figs., 4 tables, 17 refs. In German, English summary

p. 35–39. **DLC**—Investigations of carbon dioxide in the air and in surface sea water have been made in the area between Norway and Spitsbergen up to the ice limit, lat. 80°45′ in August 1936. The content of carbon dioxide in the air decreased irregularly northward until a minimum was reached after which, still further north, a gradual increase took place. The considerably higher content of carbon dioxide in the continental warm air is obvious. Interesting observational data of carbon dioxide content in continental, Arctic and maritime air masses are given in tables. *Subject Headings:* **1. Carbon dioxide data 2. Air masses 3. Arctic 4. Norway 5. Spitsbergen.**

3B–187 551.510.41:551.464(269)(93/9)

Buch, Kurt, **Beobachtungen über das Kohlensäuregleichgewicht und über den Kohlensäureaustausch zwischen Atmosphäre und Meer im Nordatlantischen Ozean.** [Observations of the carbon dioxide equilibrium and the carbon dioxide exchange between the atmosphere and ocean in the North Atlantic.] *Åbo, Finland, Akademi, Acta Mathematica et Physica,* 11(9):1–32, **1939.** 2 figs., 4 tables, 16 refs. In German, English summary p. 28–31. **DLC**—A series of observations of carbon dioxide content in the air and its tension in the surface water of the ocean was made by the author in summer 1935 during his voyage to the United States and back to Finland. Data are presented in tables and compared with those obtained in Woods Hole, Mass. From the measurements it appears that during the early summer the North Atlantic is absorbing carbon dioxide. Maritime air had a lower content of carbon dioxide than the continental one. *Subject Headings:* **1. Carbon dioxide 2. Atlantic Ocean.**

3B–188 551.510.41:551.583.7

Callendar, G. S., **The composition of the atmosphere through the ages.** *Meteorological Magazine,* London, 74:33–39, **1939. DLC**—A re-discussion of the carbon dioxide theory. Permo-Carboniferous and Quaternary glaciations attributed to removal of carbon dioxide by great forests of Coal Measures and Tertiary. Present rise of temperature due to consumption of coal. (*Same abstract* as No. G–44 in July 1950 *Meteorological Abstracts.*) *Subject Headings:* **1. Carbon dioxide 2. Geological climates.**—*C.E.P.B.*

3B–189 551.510.41:550.4

Jones, H. Spencer, **The evolution of the earth's atmosphere.** *Meteorological Magazine,* London 74(877):7–11, Feb. **1939. DLC**—Some physical laws which determine the type of atmosphere possessed by a planet are explained and it is shown that the atmosphere of the earth has been greatly changed by organic action and rock weathering. *Subject Headings:* **1. Carbon dioxide 2. Atmospheric evolution.**

1940

3B–190 551.510.41

*Callendar, G. S., **Variations of the amount of carbon dioxide in different air currents.** *Royal Meteorological Society, Quarterly Journal,* 66(287):395–400, Oct. **1940.** 2 tables, 13 refs. **DWB**—Brief review of the present state of knowledge concerning the variations of atmospheric carbon dioxide. Some observational data are presented to show the fact that the amount of this gas in the air has increased during the recent years. *Subject Heading:* **1. Carbon dioxide variations.**

1941

3B–191 551.510.41

Kreutz, Wilhelm, **Kohlensäure Gehalt der unteren Luftschichten in Abhängigkeit von Witterungsfaktoren.** [Carbon dioxide content in the lower air layers in relation to weather factors.] *Angewandte Botanik,* Berlin, 23:89–117, **1941.** 11 figs., 7 tables, 4 refs. **DA**—Measurement of carbon dioxide content in the air were made during 1.5 years at different heights. The following results were obtained: 1) the mean value for the air layer at 14 m. was determined as 0.04385 volume percent, 2) considerable differences were observed at 0.5, 2.0 and 14.0 m. The carbon dioxide amount decreases at first with the increasing height, then increases again. This is explained by the effect of two components. 3) The influence of insolation and air pressure on the content of carbon dioxide in the air was established. *Subject Heading:* **1. Carbon dioxide variations.**

3B–192 551.510.41:550.4

Poole, John Hewitt J., **The evolution of the atmosphere.** *Royal Society of Dublin, Scientific Proceedings,* New Ser., 22:345–365, **1941.** 4 tables, 22 refs. Abstracted from reprint. **DWB**—A highly speculative paper discussing the changes of the amount of all atmospheric gases in different ages. Considers the possibility that the excess carbon was present in the primitive atmosphere as a compound gas other than CO_2. The most probable gas would be methane CH_4. *Subject Headings:* **1. Carbon dioxide 2. Atmospheric evolution.**

1942

3B–193 551.510.41:551.464

Buch, Kurt, **Kohlensäure in Atmosphäre und Meer.** [Carbon dioxide in the atmosphere and in the sea.] *Annalen der Hydrographie*, 70(7):193–205, **1942.** 4 figs., 18 refs. **DLC**—Comprehensive treatise of the carbon dioxide geochemical cycle, considering the development of production and consumption processes. Discoveries and theoretical suggestions of C.-G. Rossby, Goldschmidt, Callendar and others, pertaining to this problem, are discussed. *Subject Headings:* **1. Carbon dioxide 2. Carbon dioxide exchange.**

1944

3B–194 551.510.41(42)

Glückauf, E., **Carbon dioxide content of atmospheric air.** *Nature*, London, 153(3890):620–621, May **1944.** 6 refs. **DLC**—The carbon dioxide content was determined in a number of air samples obtained by twelve balloon soundings over England, from heights of 4 to 10 km. By freezing out the carbon dioxide and water and pumping off all the other gases, the pressure of carbon dioxide was obtained. The percentage ranged from 0.024 to 0.030. *Subject Headings:* **1. Carbon dioxide measurement 2. England.**

1948

3B–195 551.510.41:534

Abbey, R. L. and Barlow, G. E., **The velocity of sound in gases.** *Australian Journal of Scientific Research, Ser. A, Physical Sciences*, 1(2):175–189, June **1948.** 7 figs., 5 tables, 20 refs., 3 equations. **MH-BH**—Carefully conducted laboratory measurements of the speed of sound in gases were made at pressures from one atmosphere down to 5 mm. (air, nitrogen, oxygen, carbon dioxide and methane). Theory, instrumentation, tube correction and results discussed and illustrated by diagrams, charts and tables. (*Same abstract* as 2.3–177 in March 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Carbon dioxide 2. Sound velocity.**—*M.R.*

3B–196 551.510.4(268)

Buch, Kurt, **Der Kohlensäuregehalt der Luft als Indikator der meteorologischen Luftqualität.** [Air's carbon dioxide content as an indicator of the meteorological quality of air.] *Geophysica*, Helsinki, 3:63–79, **1948.** 3 figs., 5 tables, 11 refs. **DWB, MH-BH**—Research on the relation between atmospheric composition and meteorological conditions began in 1921 when Finnberg made regular analyses of the quantity of nitrogen in the atmosphere, with negative results. Tests of CO_2 content were made in 1932 north of Iceland and related to air masses by Erik Palmén. Later (1935), tests were made over the Atlantic from Skagen to Boston and New York to Copenhagen; in 1936 from Narvik to 80°45′N., 12°53′E. and from Sept. 1933 to 1935 in Petsamo fiord. Results of these analyses show that extreme Arctic air has least CO_2 and continental and tropical air the most. The mean values are the following:

	cm.³/10 l.
Arctic air of high latitudes	2.23
Arctic air	3.04–3.08
Maritime air (north and middle part of Atlantic Ocean)	3.14–3.31
Continental and tropical air	3.26–3.66

Also CO_2 increases from spring to autumn, and there has been a 10% increase in the past 35 years (average 2.82 to 3.22). The result of measurements of the change of CO_2 with altitude in a mass of continental polar air, which stayed 36 hours over the sea surface, are as follows:

Height	0.3	1.5	4.0	8.0	30.0 meters
Quantity of CO_2	3.07	3.12	3.12	3.14	3.29 cm.³/10 l.

(*Same abstract* as No. 7–30 in July 1950 *Meteorological Abstracts.*) *Subject Headings:* **1. Carbon dioxide 2. Air masses 3. Sea air 4. Arctic.**—*M.R.*

1949

3B–197 551.510.41:551.510.5

†Bates, D. R., **The earth's upper atmosphere.** *Royal Astronomical Society, Monthly Notices*, 109(2):215–245, **1949.** 7 tables, 40 formulas, numerous refs. **DLC**—A systematic account of the subject summarizing the data about the constitution, the density and the temperature at various levels of the atmosphere. Fractional volume concentration of each constituent at ground level is given in a table, showing 0.003 for carbon dioxide. *Subject Headings:* **1. Carbon dioxide 2. Upper atmosphere.**

3B–198 551.510.4:551.583.7

Callendar, G. S., **Can carbon dioxide influence climate?** *Weather*, 4(10):310–314, Oct. **1949.** 2 tables, 4 refs. **DWB**—The interpretation of climatic change in terms of the variable carbon dioxide content of the atmosphere, proposed first by the Swedish physicist SVANTE ARRHENIUS some sixty years ago, is explained and the historical development of this theory is considered. Estimation of the effect of fuel combustion on the atmospheric carbon dioxide is shown in a table, as well as the trend of temperature in various regions. The climates of the world show that slightly more solar heat is being retained in the atmosphere and this could be considered as a result of increasing carbon dioxide content, which contributes to the opacity of terrestrial heat. *Subject Headings:* **1. Carbon dioxide 2. Climatic changes.**

3B–199 551.510.41:551.587.3

Chamberlin, Rollin T., **Geological evidence on the evolution of the earth's atmosphere.** (In: **Atmospheres of the earth and planets.** Gerard P. Kuiper (*ed.*). Chicago, University of Chicago Press [**1949**]. p. 149–158. 5 figs., 2 tables.) **DLC**—The implications of the molten globe and accretion hypotheses of the origin of the earth to the genesis and early history of the atmosphere are examined. The geological record indicates that climatic and atmospheric conditions of early geologic times have not been different from those of later geologic history. Water vapor is the most abundant volcanic gas, with CO_2 next. The uncombined oxygen of the air comes from outside the lithosphere. Photosynthesis by plants is quantitatively adequate to liberate from CO_2 all the oxygen needed. It is generally assumed that much of the nitrogen in volcanic gases is primary and hence is a new contribution to the atmosphere. (*Same item* as No. 11–42 in Nov. 1950 *Meteorological Abstracts.*) *Subject Headings:* **1. Carbon dioxide 2. Geological climates. I. Kuiper, Gerard P. (*ed.*).—*I.L.D.***

3B–200 551.510.41:523.42

Dunham, Theodore, Jr., **Spectroscopic observations of the planets at Mount Wilson.** (In: **Atmospheres of the earth and planets.** Gerard P. Kuiper (*ed.*). Chicago, University of Chicago Press [**1949**]. p. 286–303. 6 figs., 22 refs.) **DLC**—Modes of vibration of carbon dioxide molecules and the wave numbers of lines in CO_2 bands in the spectrum of Venus are shown in figures. It is supposed that the amount of carbon dioxide in the atmosphere of Venus is about 400 meter-atmospheres, apart from any pressure effect. (*Same item* as No. 2.3–1 in March 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Carbon dioxide 2. Planetary atmospheres. I. Kuiper, Gerard P. (*ed.*).—*I.L.D.***

3B–201 551.510.41:523.4

Kuiper, Gerard Peter, **Survey of planetary atmospheres.** (In: **Atmosphere of the earth and planets.** Gerard P. Kuiper (*ed.*). Chicago, University of Chicago Press [**1949**]. p. 204–345. 14 figs., 6 tables, 38 refs., 4 equations.) **DLC**—Gives physical data for atmospheric constituents. Amounts of carbon dioxide in the atmosphere of planets are shown in a provisional table. The atmosphere of Mars contains slightly more than 2.2 as much carbon dioxide as the atmosphere above McDonald Observatory. *Subject Headings:* **1. Carbon dioxide 2. Planetary atmospheres.**

1950

3B–202 551.510.41:551.521.3

Deacon, E. L., **Radiative heat transfer in the air near the ground.** *Australian Journal of Scientific Research, Ser. A, Physical Sciences*, 3(2):274–283, June **1950.** 2 figs., 4 tables, 12 refs. **MH-BH**—The author describes the construction of a radiation chart for calculating the rates of heating or cooling by long wave radiation in the lowest 100 meters of the atmosphere. The radiation due to CO_2 is taken into account and is considered to be additive to that due to water vapor. Since the emissivities of CO_2 and water vapor are independent of temperature, the radiation chart is constructed from the emissivities of moist air and water vapor. (*Same abstract* as No. 2.4–168 in April 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Carbon dioxide 2. Infrared absorption.** —*I.L.D.*

2B–203 551.510.41:551.508.95

Effenberger, Ernst, **Messmethoden zur Bestimmung des CO_2-Gehaltes der Atmosphäre und die Bedeutung derartiger Messungen für die Biometeorologie und Meteorologie . . . (1. Teil: Messmethoden).** [Methods of measurement of the CO_2 content of the atmosphere and the importance of such measurements for biometeorology and meteorology. (Pt. 1. Methods of measurement.)] *Annalen der Meteorologie*, 3(11/12):321–328, **1950.** 4 figs., table, 15 refs. German and English summaries p. 321. **MH-BH**—After pointing out the importance of CO_2 in meteorology, the author describes methods of analysis: gravimetric (weight of absorbed CO_2), unsuitable; an-

alytical (e.g., $Ba(OH)_2 = BaCO_2 + H_2O$), used by him as a standard. He then describes various rapid methods: his own (change of pH in barytes water), WINKLER's (conversion of Na_2CO_3 into $NaCO_3$, results too low) and WILSON's (solution of $NaCO_3$). Selfrecording methods are costly, they include electrical conductivity, reaction heat, pH measurements and infrared absorption. (*Same abstract* as No. 2.9–35 in Sept. 1951 *Meteorological Abstracts.*) *Subject Heading:* **1. Carbon dioxide measurement.**—*C.E.P.B.*

3B–204 551.510.41:551.521.3

Jones, Robert and Bell, Ely E., **The 2.7μ-bands of carbon dioxide.** *Physical Review*, 79(6):1004, Nov. **1950.** table. **DLC**—Measurements of carbon dioxide absorption bands have been made in a vacuum grating spectrometer with no interference from water vapor. The records are presented. *Subject Headings:* **1. Carbon dioxide 2. Infrared absorption.**

3B–205 551.510.41:551.521.3

Kaplan, Lewis D., **Line intensities and absorption for the 15-micron carbon dioxide band.** *Journal of Chemical Physics*, 18(2):186–189, Feb. **1950.** 5 tables, refs., 18 equations. Abstracted from reprint. **DLC**—THORNDIKE's value of $560 \times 10''$ cycles per centimeter-atmosphere for the total intensity of the 15-micron CO_2 band is used to calculate the line intensities at one atmosphere and 3000°K. Calculation of absorption curves by MARTIN and BARKER. Absorption for 203 mb. and 218°K. is recalculated, correcting previous errors and using better approximation. (*Same abstract* as No. 2.1–97 in Jan. 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Carbon dioxide 2. Infrared absorption.**—*From author's abstract.*

3B–206 551.510.41:551.583

Kramer, C., **Nogmaals: het Koolzuurgas in de atmosfeer en het klimaat.** [Again: Carbon dioxide in the atmosphere and climate.] *Hemel en Dampkring*, 48(11):189–191, Nov. **1950.** ref. **DLC**—It is pointed out that the quantity of CO_2 produced by the photosynthetic processes in about three days is greater than that produced by man's industrial activity in an entire year. The carbon reserves and CO_2 equilibrium in the atmosphere are discussed. The CO_2 equilibrium can be disturbed over short periods, such as several centuries, so that CO_2 content of the atmosphere may increase temporarily and a warming up of the climate may result. (*Same abstract* as 2.3–44 in March 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Carbon dioxide 2. Climatic changes.** —*I. L. D.*

3B–207 551.510.41

*Misra, R. K., **Studies on the carbon dioxide factor in the air and soil layers near the ground.** *Indian Journal of Meteorology and Geophysics*, 1(4):275–286, Oct. **1950.** 4 figs., 10 tables, 11 refs. **DWB**—Variations in the CO_2 content in the soil, crops and air were studied during the years 1941–1943 at the Central Agricultural Meteorological Observatory. Instruments described and data on diurnal and monthly variations, variations with height and depth, influence of irrigation and crop covers, etc. presented and discussed. More CO_2 in air of crops at night and in winter than in open, by day or in summer, respectively. (*Same abstract* as No. 2.6–37 in June 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Carbon dioxide variations 2. Soil air.**—*M.R.*

3B–208 551.508.95:551.510.41

Vershinin, P. V. and Poiasov, N. P., **O metodike analiza pochvennogo vozdukha.** [Methods of analysis of soil air.] *Vsesoiuznaia Akademiia Sel'skokhoziaĭstvennykh Nauk, Doklady*, No. 6:34–38, June **1950.** 2 figs., table, 6 refs. **DLC**—A new method of extracting samples of soil air at different depths by means of a tubular bore and the procedure of analyzing its CO_2 and O_2 content are described and explained. After a detailed description of the bore or "needle," which consists of a glass tube with an inserted steel rod and equipped with a locking tip which permits the extraction of air samples from different levels of the soil, the authors describe the simple manner of analyzing its CO_2 and O_2 content. This is made with the aid of a "Norze" gas analyzer specially modernized by the authors for this purpose. The method has been thoroughly checked and has given very good results in cases when the CO_2 content of soil air exceeded 2% (usual soil condition). A table showing results of determinations of CO_2 and O_2 content made by one of the authors in a rye field on May 7 and June 9, 1949 is presented. The analyses reflect changes in the composition of the soil air due to rainfall which clogged the capillaries in the upper soil layer and temporarily hampered the aeration. *Subject Headings:* **1. Carbon dioxide measurement 2. Carbon dioxide apparatus 3. Soil air.**

1951

3B–209 551.510.41:551.521.3

†Benedict, W. S. and Plyer, Earle K., **Absorption spectra of water vapor and carbon dioxide in the region of 2.7 microns.** *U. S. National Bureau of Standards, Journal of Research*, 46(3):246–265,

March **1951.** 9 figs., 6 tables, 19 refs. **DWB**—Using a recently developed grating spectrograph of high resolution, the authors re-investigated the atmospheric absorption in the region of 2.7 microns, and have arrived at a new identification of $-\nu_1$, extended the analysis of $-\nu_3$ to higher values of J and identified a number of lines of two combination bands of carbon dioxide, which had not previously been studied seriously. More than 450 absorption lines observed between 2.43 microns and 2.87 were measured and their identification and intensity are presented in table form. *Subject Headings:* **1. Carbon dioxide 2. Infrared absorption.**

SUPPLEMENTARY MATERIAL

3B–210 551.510.41

IUkov, G. IU., **Kontsentratsiia uglekisloty v pochvennom vozdukhe.** [Concentration of carbon dioxide in soil air.] *Khoziaĭstvo*, St. Petersburg, No. 7:37–46, **1911. DLC**—It was found by the author that soil air has a high concentration of carbon dioxide at the depth of 30 cm below the surface. *Subject Headings:* **1. Carbon dioxide 2. Soil air.**

3B–211 551.510.41:551.508.95

Lehman, Paul, **Messungen der freien Kohlensäure in und über dem Boden einiger der bioklimatischen Stationen des Lunzer Gebietes.** [Measurements of free carbon dioxide in and above the ground at several bioclimatic stations in the Lunz region.] *Österreichische Botanische Zeitschrift*, Vienna, 80(2):98–107, **1931.** 3 figs., table, ref. **DA**—A method for measuring carbon dioxide in soil air is described. Heavy rains cause considerable decrease in the free CO_2 content in soils under potatoes and barley. *Subject Headings:* **1. Carbon dioxide 2. Carbon dioxide measurement 3. Soil air.**

3B–212 551.510.41

Stöcker, O., **Über die Assimilationsbedingungen im tropischen Regenwald.** [Assimilation conditions in tropical rain forests.] *Deutsche Botanische Gesellschaft, Berichte*, Berlin, 49:267–273, **1931.** table, 7 refs. **DA**—The content of carbon dioxide in the air of tropical forests was investigated and it was found that the amount was slightly lower than that in temperate forests. *Subject Headings:* **1. Carbon dioxide 2. Forest air.**

3B–213 551.510.41:63

Balks, R. and Rintelen, P., **Über die Veränderungen des Luftkohlensäuregehaltes bei Kohlensäurebegasung im Freiland.** [Changes in the CO_2 content of the air during CO_2 fumigations in fields.] *Zeitschrift für Pflanzenernährung, Düngung und Bodenkunde*, Berlin, A31:44–56, **1933.** 2 figs., 5 tables, refs. **DA**—Meteorological and chemical data obtained in the experiment are discussed. The amount of carbon dioxide in the air in contact with leaves can be increased to a significant extent in calm weather. *Subject Headings:* **1. Carbon dioxide 2. Crop fumigation.**

3B–214 551.510.41:551.508.95

Smith, Elizabeth M., **The determination of CO_2 content of an atmosphere in a closed system.** *Science*, New York, 80(2074):294, Sept. **1934.** 3 refs. **DLC**—Two methods for determining the content of carbon dioxide in the atmosphere are described. *Subject Heading:* **1. Carbon dioxide measurement.**

3B–215 551.510.41:551.556

Szymkiewicz, Dezydery, **Wpływ wiatru na koncentracje dwutlenku wegla w powietrzu.** [Effect of the wind on the concentration of carbon dioxide in the air.] *Pozciki Nauk Rolniczych i Leśnych*, Poznań, 33:13–22, **1934.** fig., 2 tables, 2 refs. **DA**—Carbon dioxide content in the air varies during the day because of emanations from the soil, assimilation of green plants and wind. With increasing velocity of wind from 0 to 0.8 and 1.2 m/sec, the concentration of carbon dioxide decreases from 1.22 to 0.67 and 0.54 mg/l, respectively. *Subject Headings:* **1. Carbon dioxide variations 2. Wind effects.**

3B–216 551.510.41:551.508.95

May, J., **Beiträge zur Gasinterferometrie.** [Contributions to gas interferometry.] *Zeiss-Nachrichten*, Jena, 2(8):286–296, **1938.** 5 tables, 5 figs. **DLC**—A gas interferometer is described. The instrument is applied to the analysis of air. The smallest detectable amount of carbon dioxide is 0.478 parts in 10,000. *Subject Heading:* **1. Carbon dioxide apparatus.**

3B–217 551.510.41:551.508.95(85)

Pozzi-Escot, Emm., **Hacia el conocimiento de la composición del aire en Lima, su riqueza en anhídrido carbónico.** [On the knowledge of the composition of air in Lima, its content of carbon dioxide.] *Revista de Ciencias*, Lima, 40(423):133–140, **1938.** ref. **DLC**—Description of method and some results of measurements are given. The content varied from 3.09 to 3.37 parts in 10,000. *Subject Headings:* **1. Carbon dioxide measurement 2. Urban air 3. Lima, Peru.**

3B–218 551.510.41:551.508.95

Pfund, A. H., **Atmospheric contamination.** *Science*, New York, 90:326–327, **1939.** fig. **DLC**—Description of an apparatus for determining gases such as carbon dioxide, which have characteristic absorption bands in the infrared. *Subject Headings:* **1. Carbon dioxide apparatus 2. Infrared absorption.**

3B–219 551.510.41:551.508.95

Dingle, Herbert and Pryce, A. W., **Estimation of small quantities of carbon dioxide in air by the absorption of infrared radiation.** *Royal Society of London, Proceedings, Ser. B*, 129:468–474, **1940.** 4 figs., 6 refs. **DLC**—Small amounts of carbon dioxide in the air can be determined with a thermopile by measuring the absorption of transmitted infrared radiation. *Subject Headings:* **1. Carbon dioxide measurement 2. Infrared absorption.**

3B–220 551.510.41:637

Zorn, W. and Freidt-Kraftborn, G., **Registrierende Bestimmungen der Luftzusammensetzung im Rinderstall.** [Recording the composition of the air in stables.] *Forschungsdienst*, Berlin, 11(3–4):402–426, **1941.** 9 figs., 3 tables, 33 refs. **DA**—The content of carbon dioxide in the air of a stable housing 75 cows was measured. The values obtained were 0.09–0.24 g/hr/l, it varied in direct proportion with absolute humidity and had no relation to relative humidity and temperature variations. *Subject Headings:* **1. Carbon dioxide 2. Dairying 3. Indoor air.**

3B–221 551.510.41:551.508.95

Dymchishin, D. A., **Baritno-sodovyĭ metod opredeleniia uglekisloty v vozdukhe.** [Barium hydroxide-sodium carbonate method of determining carbon dioxide in the air.] *Vinodelie i Vinogradorstvo SSSR*, Moscow, 7(10):37–38, **1947.** fig., 2 refs. **DLC**—The author describes and illustrates an apparatus for measuring the carbon dioxide content of air. *Subject Heading:* **1. Carbon dioxide apparatus.**

3B–222 551.510.41:551.508.95

Sheppard, P. A., **Recent advances in science; meteorology.** *Science Progress*, 35:87–101, **1947.** **DLC**—Measurements of carbon dioxide content, made by means of a frost-point hygrometer, showed that the proportion of carbon dioxide in the lower stratosphere is the same as near the surface—0.03% by volume. *Subject Headings:* **1. Carbon dioxide measurement 2. Stratosphere.**

3B–223 551.510.41

Fuller, Harry J., **Carbon dioxide concentration of the atmosphere above Illinois forest and grassland.** *American Midland Naturalist*, Notre Dame, 39:247–249, **1948.** 6 tables, ref. **DLC**—The content of carbon dioxide in the air was measured at 0–1 cm above the soil surface in forest and in grasslands and was determined as being 0.10–0.14% and 0.07–0.10%, respectively. A rapid decrease of concentration with height was noticed, and above 8 cm it rarely exceeded 0.03–0.04%. *Subject Headings:* **1. Carbon dioxide 2. Forest air 3. Grassland air.**

3B–224 551.510.41:551.521.3

Kondrat'ev, K. IA., **Perenos dlinnovolnovogo izlucheniia v atmosfere.** [Transfer of long wave radiation in the atmosphere.] Moscow, Gosizdat., **1950.** 287 p. 47 figs., 26 tables, 71 refs., equations. **DLC**—On p. 57–64 the absorption capacity of carbon dioxide is discussed and formulae for computation of the absorption of infrared rays, affected by carbon dioxide, are given. *Subject Headings:* **1. Carbon dioxide 2. Infrared absorption.**

3B–225 551.521.3:551.510.41(411)

Gebbie, N. A., Harding, W. R., Hilsum, C., Pryce, A. W. and Roberts, V., **Atmospheric transmission in the 1 to 14μ region.** *Royal Society of London, Proceedings A*, 206:87–107, **1951.** 12 figs., table, 28 refs., 8 equations. **DWB**—Describes measurements of atmospheric transmission over complete range 1–14μ in infrared in western Scotland over paths of 2264 and 4478 yards, compared with 0.61μ. Absorption bands by H_2O, CO_2, N_2O and HDO, etc. were recorded (figs. 7a, 7b). Variation of transmission was found as ratio of that at 2.18, 3.61, 10.01 and 11.43μ to 0.61μ; reduction with decreasing visibility became less as wave length increased. At 10μ it depends closely on water

vapor in the path. The results are explained by scattering by salt nuclei; it is calculated that a size distribution similar to that occurring naturally would suffice. As humidity increases, nuclei increase in size. For a visual transmission of 40% per sea mile the most frequent radius is 0.4μ. *Subject Headings:* **1. Carbon dioxide 2. Long wave transmission 3. Infrared absorption 4. Scotland.**—*C.E.P.B.*

3B–226 551.510.41

Glückauf, E., **The composition of atmospheric air.** (In: American Meteorological Society, **Compendium of Meteorology.** Boston, **1951.** p. 3–10. tables, graphs, refs.) **MH-BH**—A concise outline of the complete knowledge of the atmospheric composition as regards the molecular species present and their absolute quantities. The part devoted to carbon dioxide is found on p. 4–5. Results of quantity investigations on carbon dioxide in the atmosphere and their variations affected by different causes are presented. Results of Callendar's investigation are presented graphically, showing the increase of carbon dioxide content in the air which was well marked during the first half of the 20th century. This increase represents about 30 parts per mill in the total atmosphere, or 2×10^{11} tons, which equals approximately the amount resulting from the combustion of fuels during this period. *Subject Headings:* **1. Atmospheric composition 2. Carbon dioxide. I. American Meteorological Society.**

3B–227 551.586:631.4(54)

Misra, R. K., **Further studies on the carbon dioxide factor in the air and soil layers near the ground.** *Indian Journal of Meteorology and Geophysics*, 2(4):284–292, Oct. **1951.** 2 figs., 5 tables, 5 refs., append. **MH-BH**—The paper describes the results of a field experiment conducted at the Central Agricultural Meteorological Observatory in Poona during 1941–1943. It was shown that the content of carbon dioxide in the soil air varies a great deal from place to place in the same field whether bare or cropped. The greater concentration of carbon dioxide in the soil air is associated with taller sugarcane plants and larger foliage development. A pot-culture experiment with cotton plants, where the carbon dioxide was added in irrigation water showed similar results. *Subject Headings:* **1. Carbon dioxide 2. Soil air 3. Crops 4. Poona, India.**

3B–228 551.510.41:550.4

†*Rubey, William W., **Geologic history of sea water.** *Geological Society of America, Bulletin*, 62(9):1111–1148, Sept. **1951.** 4 figs., 6 tables, biblio. **DLC**—The problem of changes in composition of sea water and atmosphere during geologic time is discussed in great detail, and the problem of how the conditions could have remained so nearly constant for so long is explained. Evidence is given of the fact that the amount of carbon dioxide in the atmosphere and in the ocean has remained relatively constant throughout much of geologic history. The volatile materials like HO, CO, Cl, N and S are much too abundant in the present atmosphere and in ancient sediments to be explained as the products of rock weathering alone. A mechanism which could account for a continuous escape of volatile substances from juvenile sources to the earth surface, keeping the hydrosphere and atmosphere in uniform composition, is suggested. *Subject Headings:* **1. Atmospheric composition 2. Carbon dioxide 3. Paleogeology 4. Carbon dioxide exchange.**

3B–229 551.510.41

Doiarenko, A. C., **K metodike posloĭnogo opredeleniia ugol'noĭ kisloty v nadpochvennom vozdukhe.** [A method of determination of carbon dioxide in successive air layers above the soil.] *Pochvovedenie*, 2:168–169, **1952. MH-BH**—The method described here can be used to investigate carbon dioxide in different air layers near the ground. It was developed to prove experimentally the controversial theory that soil causes an increase in the CO_2 content in the air strata directly above it, an increase which influences plant growth. Previous difficulties encountered in layer by layer determination of CO_2 appear to be eliminated by the author's method. *Subject Headings:* **1. Carbon dioxide measurement. 2. Soil air.**

Note: Although a number of papers which deal with infrared absorption by CO_2 are included in this bibliography, no attempt has been made to cover all of the classical theoretical papers (such as those by Langley (1881), Elsasser (1940), Kaplan (1947), Herzberg (1945), Yamamoto (1949), Philipps (1940) and many others), since these are being retained for a more inclusive bibliography on long wave radiative processes in the atmosphere. The latter will include absorption and emission by ozone, water vapor, CO_2 and other gases.—*M.R.*

PART III. METEOROLOGICAL ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

Note: The contents of periodicals included in this section are for information only, and will not be listed in the monthly indexes until abstracted. When material is furnished in advance of data of publication, the pagination may be omitted.

Angewandte Meteorologie, Volume 1, Number 1, June 1951.

Reinhard, H.: **Karten zur Klimabewertung bei der Bodenschätzung in Mecklenburg,** [Climatic classification charts based on soil types in Mecklenburg], p. 2–14.

Steubing, Lore: **Bodentemperaturen und ihr Einfluss auf Thymus Serpyllum an verschiedenen Standorten,** [Soil temperatures and their influence on mountain thyme in various situations], p. 15–19.

Wagner, Heinrich: **Einfluss föhnartiger Verhältnisse auf den Komplementgehalt bei Rheumatikern,** [Influence of föhn-like conditions on the complement-content (i.e., bacteria-destroying substance) in rheumatics], p. 19–23.

Spangenberg, W. W.: **Atmung bei Schwüle,** [Breathing in sultry weather], p. 24–28.

Bolz, H.-M.: **Bioklimatologische Hauttemperaturstudien am Ostseerand,** [Bioclimatic studies of skin temperature on the Baltic shore], p. 28–31.

Angewandte Meteorologie, Volume 1, Number 2, September 1951.

Spangenberg, Wolf W.: **Über die Ursachen der Schwüleempfindung. [Einige Bemerkungen zu der gleichnamigen Arbeit von H. Mrose in Z.f.Met. 5(1951), 55.]** [On the causes of the feeling of sultriness. (Some remarks on the work with the same title by H. Mrose . . .)], p. 33–35.

Morgen, Alois: **Beiträge zur Geschichte der Phänologie zum zweihundertsten Jahr ihrer Begründung,** [Contributions to the history of phenology on the 200th. year since its beginning], p. 36–43.

Hentschel, Gerhard: **Ein Beitrag zur Phänologie der Schneeglöckchenblüte,** [A contribution to the phenology of the snowdrop], p. 43–53.

Mäde, O.: **Temperaturbeobachtungen an vereinfachten Klimastationen,** [Temperature observations at simple climatic stations], p. 53–56.

Schrödter, H.: **Die Niederschlagsverhältnisse in Sachsen-Anhalt 1947/48 als Ursache der kreisweisen Befallsunterschiede beim Massenauftreten des Rüben-Derbrüsslers 1948,** [The rainfall conditions in Saxony-Anhalt as a cause of the local distribution in severe occurrences of the turnip flea beetle], p. 60–62.

Akademiia Nauk, SSSR, Izvestiia, Seriia Geograficheskaia, Number 1, 1951.

Budyko, M. I.: **O vliianii meliorativnykh meropriiatiĭ na ispariaemost',** [On the effect of conservation measures on evaporation], p. 16–35.

Buianovskiĭ, M. S.: **Voprosy sel'skogo khoziaĭstva Zapadnogo Kazakhstana, sviazannye s obvodneniem Prikaspiia,** [The problems of agriculture of Western Kazakhstan in connection with irrigation in the Pre-Caspian region], p. 46–57.

Smal'ko, IA. A.: **Novye dannye ob izmenenii temperatury vozdukha i pochvy na poliakh, zashchishchennykh set'iu lesnykh polos,** [New data on the change in air and soil temperature of fields protected by shelter belts], p. 67–70.

Isakov, I. S.: **Pervyĭ tom morskogo atlasa,** [First volume of the Marine atlas], p. 72–74.

Zarutskaia, I. P. and Zenkovich, V. P.: **Gipsometricheskaia karta SSSR v m. 1:2 500 000,** [Hypsometric chart of the USSR on a scale of 1:2,500,000 m.], p. 74–79.

Zenkevich, L. A.: **Rabota sovetskikh okeanologov v 1949–1950,** [Work of Soviet oceanologists in 1949–50], p. 79.

Akademiia Nauk, SSSR, Izvestiia, Seriia Geograficheskaia, Number 2, 1951.

Beliakov, M. F.: **Temperaturnye izmereniia N. N. Miklukho-Maklaia v Tikhom i Indiĭskom okeanakh,** [Temperature measurements in Pacific and Indian Ocean by N. N. Miklukho-Maklaĭ], p. 49–55.

Budyko, M. I, Drozdov, O. A. and IUdin, M. I.: **K voprosu o kolichestvennom raschete izmeneniĭ prirodnykh usloviĭ,** [On the question of quantitative calculation of changes of natural conditions], p. 57–61.

Akademiia Nauk SSSR, Izvestiia, Seriia Geograficheskaia, Number 3, 1951.

Obruchev, V. A.: **Rol' i znachenie pyli v prirode,** [Role and importance of dust in nature], p. 15–27.

Markov, K. K.: **A. I. Voeĭkov kak istorik klimatov zemli,** [A. I. Voeĭkov as an historian of the climate of the earth], p. 46–54.

Ioganson, V. E. and Obukhov, A. M.: **Izuchenie sukhoveev Prikaspiia,** [Investigations of the Pre-Caspian hot dry winds], p. 94–95.

Akademiia Nauk, SSSR, Izvestiia, Seriia Geofizicheskaia, Number 5, September–October 1951.

Byzova, N. L.: **Samovozbuzhdaiushchiesia kolebaniia potoka teplovoĭ konvektsii,** [Self induced fluctuations of convective heat current], p. 84–92.

American Geophysical Union, Transactions, Volume 32, Number 6, December 1951.

Aslakson, Carl I.: **New determinations of the velocity of radio waves,** p. 813–821.

Dobrin, M. B., Simon, R. F. and Lawrence, P. L.: **Rayleigh waves from small explosions,** p. 822–832.

Brooks, F. A. and Kelly, C. F.: **Instrumentation for recording microclimatological factors. Discussion by Schultz, Herbert B.,** p. 833–848.

Sherman, Leon: **A kinematic relationship in the field of motion in storms,** p. 849–852.

Hardy, Albert V.: **Analyzing turbulence by means of photographs of airborne particles,** p. 853–860.

Chernosky, Edwin J.: **The variation of the geomagnetic-activity recurrence interval with the solar cycle,** p. 861–865.

O'Brien, Morrough P.: **Wave measurements at the Columbia River light vessel, 1933–1936,** p. 875–877.

MacDougal, Franc: **Correlation of heights of observed and computed deep-water wind waves in North Atlantic Ocean and Mediterranean Sea,** p. 878–880.

van Bavel, C. H. M. and Waltner, A. W.: **An electrical analogue for the study of diffusion processes with internal gains or losses,** p. 885–890.

Rowe, P. B. and Hendrix, T. M.: **Interception of rain and snow by second-growth ponderosa pine,** p. 903–908.

Goodell, B. C.: **A method for comparing the flow from a pair of experimental watersheds,** p. 927–930.

Anderson, Ernest R. and Marciano, J. J.: **Discussion of "A comparison of several heat and mass transfer networks of interest in water conservation" by H. F. Poppendiek and M. Tribus. Reply by Poppendieck, H. F. and Tribus, M.,** p. 931–932.

Wilson, Walter T.: **Discussion of "Variations in storm rainfall over small areas" by Ray K. Linsley and Max A. Kohler. Reply by Linsley, Ray K. and Kohler, Max A.,** p. 932–933.

Annalen der Meteorologie, Volume 4, Number 1–6, 1951.

Schmauss, August: **Alfred Wegeners Leben und Wirken als Meteorologe,** [Alfred Wegener's life and work as a meteorologist], p. 1–13.

Rudloff, Willy: **Die Driftzahl oder der atmosphärische Drehimpuls als Zirkulationsmass,** [The drift number or the atmospheric angular momentum as a measure of the circulation], p. 14–26.

Guss, Hans: **Zur Struktur von Häufigkeitsverteilungen und Bildung von Mittel- und Schwankungswerten der Sichtweite,** [On the structure of frequency distributions of mean and variation values of visibility], p. 27–39.

Junge, Christian: **Ein neues Verfahren zur Trennung der festen und tröpfenartigen Teilchen im atmosphärischen Grobaerosol,** [A new procedure for separating the solid and liquid particles in coarse aerosols], p. 40–45.

Holzapfel, Rupert: **Zum Mechanismus des täglichen Temperaturganges in den Stockwerken der Troposphäre,** [On the mechanism of the diurnal variation of temperature in the layers of the troposphere], p. 45–48.

Rossmann, Fritz: **Über Wolkentromben,** [On cloud spouts], p. 48–55.

Paulsen, Wolfgang: **Über die Einwirkungen des Baumwuchses auf das Grossklima (Nach ausländischen Ergebnissen),** [On the effects of tree growth on macroclimate (from foreign observations)], p. 55–62.

Hesse, Walter: **Neue städteklimatologische Untersuchungen in Leipzig (Vorläufige Mitteilung),** [New urban-climatological investigations in Leipzig (Preliminary report)], p. 62–64.

Raethjen, Paul: **Das planetarische Zirkulationssystem,** [The planetary circulation system], p. 65–75.

Flohn, Hermann: **Allgemeine Zirkulation und natürliche Klimaeinteilung,** [General circulation and natural distribution of climate], p. 76–77.

Brocks, Karl: **Probleme der "Radiometeorologie,"** [Problems of "radiometeorology"], p. 78–86.

Koppe, Heinrich: **Sonnenaktivität, Grosswetter und wetterbezogene Reaktionen,** [Solar activity, general weather and reactions to weather], p. 87–96.

Schnelle, Fritz: **Methoden und Möglichkeiten einer phänologischen Klimatologie,** [Methods and possibilities of a phenological climatology], p. 97–108.

Steinhauser, Ferdinand: **Über die Abhängigkeit der Sonnen- und Himmelsstrahlung von der Höhe in den Ostalpen,** [On the dependence of solar and sky radiation on height in the eastern Alps], p. 109–114.

Koschmieder, Harald: **Zur kinematischen Theorie der Linienböe,** [On the kinematic theory of the line squall], p. 115–122.

Lingelbach, Ernst: **Neue Zeitsparende Methode zur Ausführung von Rechenoperationen,** [New time-saving method of carrying out calculations], p. 123–125.

Hinkelmann, Karl: **Quantitave (*sic*) Verfahren zur Vorausberechnung von Luftdruckfeldern,** [Quantitative experiments in calculating pressure fields in advance], p. 126–131.

Kleinschmidt, Ernst, jun.: **Untersuchung eines Tropopausentrichters mit Hilfe der ERTELschen Wirbelinvarianten Z,** [Investigation of a depression in the tropopause by means of ERTEL's vortex-invariant Z], p. 131–132.

Robitzsch, Max: **Die Angaben des Haarhygrometers,** [The indications of the hair hygrometer], p. 133–135.

Lauter, Ernst-August: **D-Schicht Beobachtungen und allgemeine Zirkulation,** [Observations of the D layer and the general circulation], p. 136–138.

Haude, Waldemar: **Zur Abschätzung des Wasserhaushaltes bei agrarmeteorologischen Untersuchungen,** [On the determination of the water economy in agricultural meteorological investigations], p. 139–150.

Schneider-Carius, Karl: **Die synoptische Bedeutung der Grundschicht,** [The synoptic importance of the ground layer], p. 150–157.

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